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Founded 1874—Fifty-Two Years of Service

Electrical World

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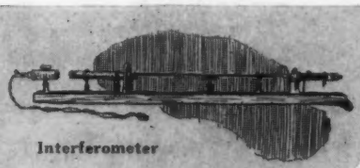
D'Arsenval Galvanometer



Interferometer

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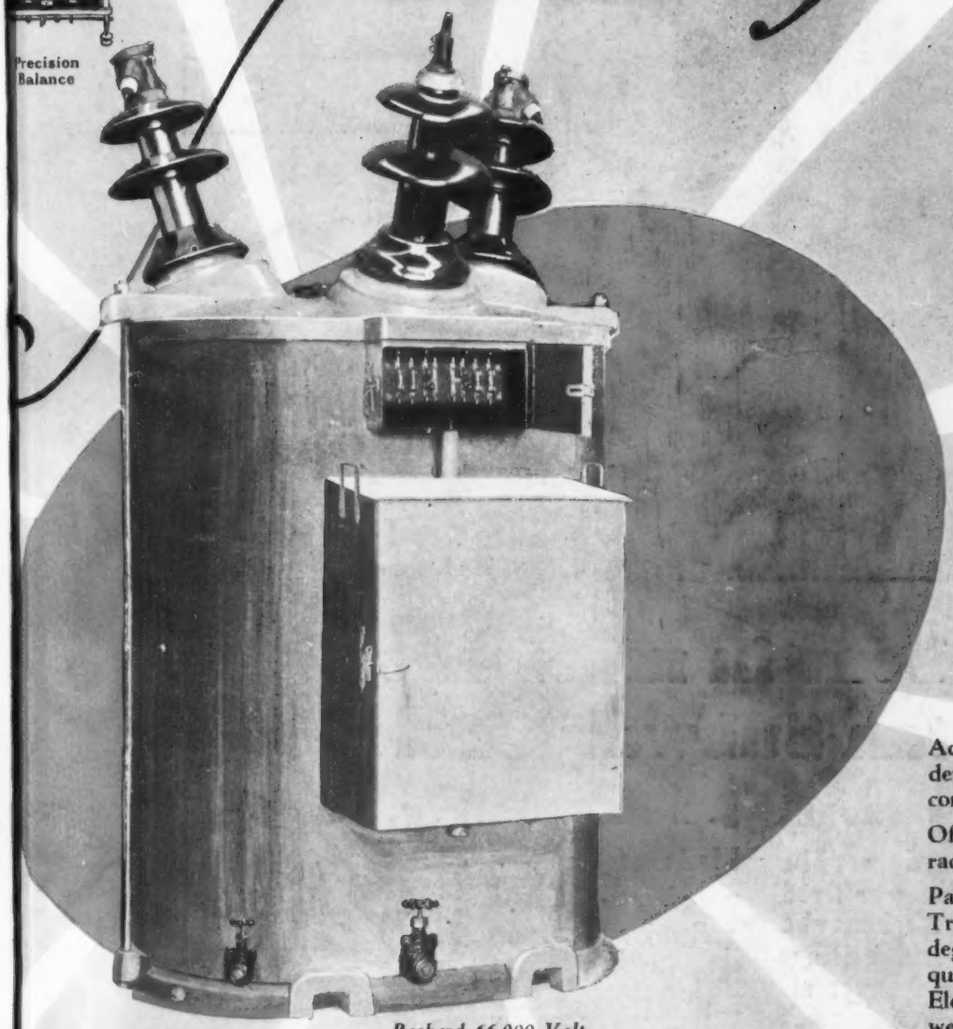
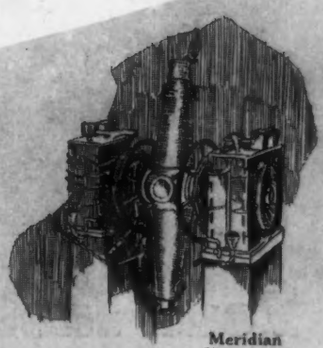


Packard 66,000 Volt 3 phase, 3 wire, 60 cycle Type P. C. W. Metering Transformer. Current and Potential Elements oil immersed in one weatherproof tank.



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Accuracy of measurement is the demand of science, the necessity of commerce.

Of fundamental importance is accuracy in metering primary power.

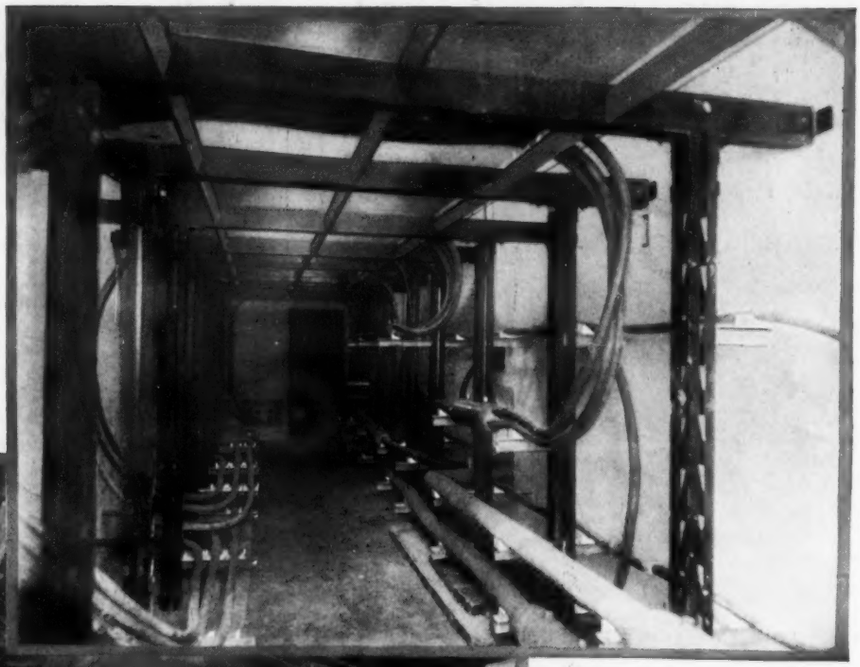
Packard Type, P. C. W. Metering Transformers furnish accuracy to a degree that is accepted in highest quarters. Current and Potential Elements, oil immersed in one weatherproof tank offer unique convenience and sturdiness. Completely phased out, ready for connection. Entire Assembly easily removable from tank without breaking soldered connections.

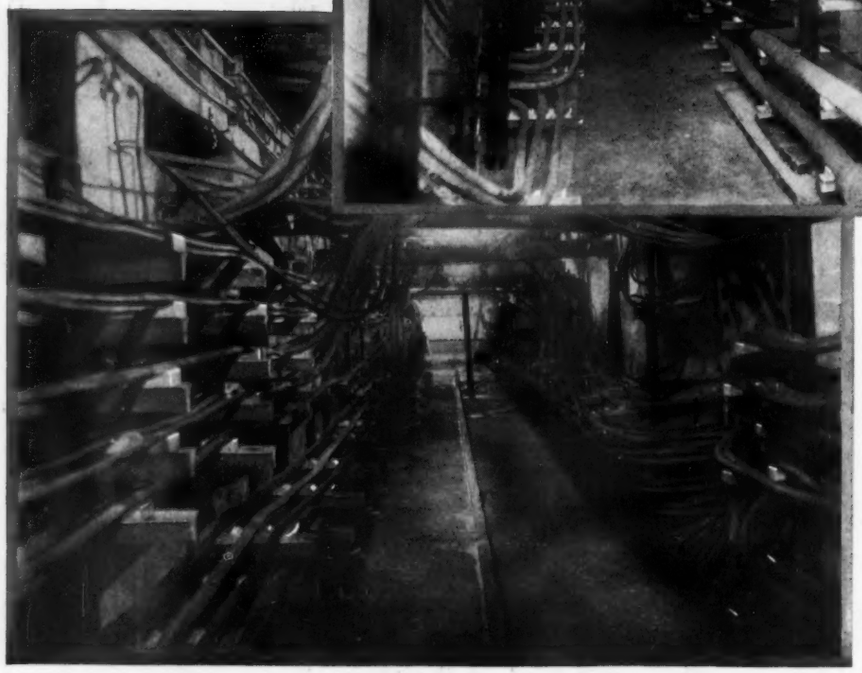
The Packard Electric Co.

Warren, Ohio

Packard is never seen, except on goods of honest value

Mounting overhead cables with Metropolitan Racks at the Malden Electric Co., Malden, Mass.





Cable vault of Malden Electric Co. showing cables, Metropolitain racks and Metropolitan cable joints.

Four facts to bear in mind about Metropolitan Subway Cable Racks

1. Protective

The porcelain insulator is a barrier against the spread of stray currents on the cable sheath thru the medium of the rack.

2. Adaptable

Cable need not be placed in set or fixed position. Rack may be mounted on ceilings —grooved hanger allows adjustment of cable position.

3. Durable

Made of steel—will not bend — hot dip galvanized — porcelain pillow for cable —nothing to corrode. Dependable.

4. Easy to Install

Two bolts put the back or stanchion in place—to change arm sizes means merely raising arm out of notches and insertion of one needed.

Booklet showing installations sent on request.

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1250 Atlantic Avenue
BROOKLYN, NEW YORK

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To Serve You even better

The photographs here cannot tell the entire story, but you will get from them an indication of the additions that have recently been made to the Kuhlman Factory—additions that will enable us to serve you and other transformer users even better than we have in the past.

The increase and improvement is not only in factory space, but also in equipment and personnel. The greater space permits arrangement of equipment for more efficient production. The new building provides better light and more pleasant working conditions. These improvements are reflected in the product and the benefits are thus realized by the purchasers of Kuhlman Transformers.

Another fact—these additions have been made possible and necessary by the ever-growing demand for Kuhlman Transformers.

Write for the Transformer Handbook E.W. 210

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BAY CITY, MICHIGAN

KUHLMAN TRANSFORMERS

POWER-DISTRIBUTION-STREET LIGHTING

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Electrical World

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W. H. ONKEN, JR.
Editor

VOLUME 88 — New York, Saturday, October 2, 1926 — NUMBER 14

The New Association of Electrical Manufacturers

THE reorganization of the two groups of manufacturers of power apparatus and electrical supplies into the National Electrical Manufacturers' Association has won the hearty indorsement of all electrical men. For there have been too many separate groups of electrical manufacturers to enable the manufacturing industry either to act with an organized purpose or to speak with a clear voice. Now the first big step has been taken toward unity and broader service. The supply manufacturers will form one division of the new association; the power apparatus manufacturers will form another; provision has been made also for the radio manufacturers, heretofore grouped in a section of the Associated Manufacturers of Electrical Supplies, to form a third division, and the executives of all member companies will form a separate policy division. It would seem not unreasonable to hope that ultimately the manufacturers of electric vacuum cleaners, clothes washers and refrigerators, now maintaining separate associations, and the manufacturers of ironing machines, who are now unorganized, may some day also desire to join together and form an appliance division of the National Electrical Manufacturers' Association. The advantages of effecting such a complete organization of the entire electrical manufacturing industry are too obvious for comment.

President Gerard Swope starts his administration of the new association with the good omen of industry approval. Under his energetic leadership the N.E.M.A. will undoubtedly exert a far-reaching, constructive influence for electrical progress.

Insulation Versus Maintenance

MAINTENANCE of transmission systems can be handled as predominantly a capital charge or as an operating charge, depending upon local conditions and the desire of engineers and executives. A noticeable tendency exists to overinsulate lines and line equipment in order to reduce maintenance charges and the troubles incident to system housekeeping. Lines are installed with one or two additional insulators, and higher-voltage breakers and transformers are purchased and installed.

The organization and operation of a system maintenance crew is a task which imposes considerable trouble and expense, and the washing of insulators and cleaning of other equipment is troublesome work which often introduces a service or an accident hazard. In addition it is difficult to gage the normal insulation requirements of a line in terms of local conditions, which may change or which may be in high degree non-uniform. Thus the expenditure of money for higher insulation is often the cheapest and easiest way to handle the larger part of the system maintenance.

On the other hand, overinsulation may represent an appreciable capital investment which may not be justified except in certain locations. The best way to determine how far to use insulation in preference to operating maintenance is to keep and to study system records. A study of the operations of the line and equipment over a series of years readily shows where to draw the balance between insulation investments and maintenance costs. In all cases it should be remembered that continuity of service for the least money expenditure is the desirable condition to attain.

As "the Captains and the Kings Depart"

ONE by one the pioneers of the electrical industry are passing to their reward. The industry is fast approaching maturity; a generation has gone since the historic developments in our major cities laid the foundations for the modern central-station system, and alternating-current transmission is now counted among the venerable methods of the art. It is true that in proportion to what is yet to come in service to mankind the industry's present development is as a patch of sunlight on a wall; but for a quarter century the old saying that "electricity is in its infancy" has been false and irritating to the engineer, and the mighty aggregation of capital and personnel which today drives the roaring loom of Time itself in electrical service represents no mean climax to the work of these rich and crowded years.

"Their works do follow them." Long after the present leadership has laid down its cares, this industry will build upon their vision and their achievements; but new ideas must come as new problems appear, and now the time has come to prepare more wisely than ever for the coming leadership. The procurement and development of fit personnel have become supremely important, and the most forward-looking organizations have recognized this and are planning to meet the responsibilities of the approaching years through the selection and training of young men specially qualified to take on the burdens and solve the problems of the future. Long may our present strong and able direction continue; but with it must go constant preparedness for the tasks of the decades ahead.

Here and there within the past few years not a few young men nurtured in the electrical industry have left it for other fields offering larger rewards for ability and enterprise. This movement will always exist among modern industries, and a certain amount of interchange is a good thing for all concerned. But there is a certain class of young men, especially those in the thirties and early forties, if the latter may be included in the category, who should be kept in this industry by all reasonable inducement—men of proved sales ability and executive capacity in particular. The years immediately ahead will need this type of leadership most keenly, and the growing competition of other industries for young

electrical men who have made names for themselves is a fact which must be faced.

There is more to this matter than the raising of salaries, important as that may be in many companies accustomed to rely upon the government-like continuity of many positions as the dominant attraction to hold their staff in service. There must be broader opportunity for playing the electrical game in a big way as well as adequate reward if these competent and ambitious men are to find in it full outlet for their abilities and driving power. Certainly the industry holds promise enough, and if the leaders of today realize the need as they should, the inevitable departure of the captains and the kings from the active direction of affairs will leave the world of applied electricity not only better because of their priceless service but stabilized by each increment of trained, enthusiastic and encouraged personnel upon whose shoulders will one day fall the immense responsibilities so long carried by the pioneers.

Political Pressure Too Great for Chicago Sanitary District

MUCH ado has been made about a report of the Chicago Association of Commerce on the financial and administrative methods of the Chicago Sanitary District. This municipal project includes a hydro-electric development for municipal service and has often been cited as an example of a well-operated municipal enterprise. But the investigation shows that political influences are difficult to resist when money can be spent. The report says: "Payrolls of unusual size are frequently in evidence. The vast expenditures for legal services of all kinds and for the maintenance and operation of plants are matters of concern." Active politicians and members of the Legislature were carried on the payroll, and the number of employees was very largely increased when election time approached. Excessive costs for some construction and restricted bids for work appeared to be the practice. The engineering work in the district was found to be good by General Taylor, who made the investigation. The final part of the report made recommendations for improvements, and these have been accepted by the Sanitary District board of trustees.

The moral to be drawn from this experience is that very reputable men when in charge of a municipal enterprise of magnitude find it difficult to give the necessary attention to the work. They cannot prevent the influence of political pressure and the resultant waste of money in construction, operation and labor. The municipal enterprise is a side issue to them, but is a ripe plum in the minds of certain politicians who exist because a city has money to spend. The encouraging thing in the report is its proof that engineers have pride in their profession and always do the best possible job. Some of the best engineering in the world has been found in municipal, state or national enterprises, and many engineers do notable work despite their political environment. There is no waste of taxpayers' money in paying salaries to these engineers, but in nearly all cases excessive construction costs, large payrolls and political selection of employees—items beyond the control of the engineers—have characterized developments of this character. The incentive to economy inherent in the private enterprise is exchanged for an incentive for spending in the political enterprise, and sooner or later the spending will occur.

Revenue Possibilities from Store Lighting

AT THE beginning of the present year about two million stores in this country were lighted by electricity. However, surveys show that the average intensity of illumination is much lower than it should be and that much of the lighting equipment is obsolete. Typical store-lighting units at present contain an average connected load of 133 watts each. That higher intensities of illumination can be sold in stores is proved by the fact that in commercial lighting campaigns conducted by central-station companies last year an average of 267 watts per unit was installed. In other words, the average wattage was doubled in these new installations. This means an average increase in gross revenue per lighting unit of $8.33 per year.

If all the stores in this country which are now lighted by electricity consumed on the average 10 foot-candles each, the increase in annual revenue to the central-station companies would be $185,000,000. This is a "new-business" opportunity worth going after, and progressive light and power companies are cultivating it. In 1925 store-lighting units were sold to the amount of $57,000,000. It is estimated that to rehabilitate the lighting of the stores in all parts of the country and to supply an average of 10 foot-candles, new wiring, fixtures and lamps to the total of $188,000,000 must be sold.

The opportunities for promoting better store lighting and thus increasing central-station revenue are abundant in all communities. Properly organized campaigns have proved that doubling the connected load is an easy matter. The conclusion in this field as in all others is that "saturation point" is an expression which may be dropped from the lighting vocabulary for several generations at least.

The Proposed N.E.L.A. National Sales Executive

GREAT interest has been aroused throughout the electrical industry in the recommendation by the N.E.L.A. Commercial Section that a national sales executive for the power companies be established at association headquarters. This is good news to manufacturers, jobbers and contractor-dealers, as well as to the central-station companies, because of the great influence for the development of the common market which may come out of such leadership. Naturally much will depend upon who the man is and what his point of view may be, but the opportunity for him to render an invaluable service cannot be questioned.

Obviously such an official cannot attempt to give instructions to the individual sales managers of local power companies; but he can assist and guide them, and by "carrying on" from one Commercial Section and committee administration to the next he can help sustain the purposes and give continuity to the policies of the association. He can make himself the

creative source of much vital information that the power industry wants right now.

In the enthusiasm which the idea naturally inspires it has been suggested, in discussions of the subject, that an able sales executive, so placed, might by the influence of his leadership act as the co-ordinating head of the entire electrical industry and guide the co-operative development of the market. To attempt this would be fatal. The electrical industry is grouped in four branches, each nationally organized, and naturally no one of them will accept the dominance of any other branch. It is for this reason that the industry has established and is maintaining an institution for handling its co-operative promotion work—the Society for Electrical Development. Moreover, indications are that through the union of the society with the leagues, under the League Council's plan, an adequate practical machinery for the proper co-ordination of all market development programs may be evolved, agreeable to all concerned.

The greatest possible opportunity for the N.E.L.A. national sales executive to be of help will lie within the power field itself. How should the central-station sales department be organized and managed? How can load factor be improved by the selective development of the market? How can industrial heating and electric transportation best be pioneered? Should the central station retail domestic appliances? What should be the central-station policy toward the "local trade"? What are the "ethics" of easy-payment selling? When does the price of electrical service begin to block the development of the market? What average of kilowatt-hour sales per capita, what average consumption per residence consumer, what average total sales of appliances per customer, from all sources, should be regarded as a satisfactory performance by any power company?

If he can find and establish the now unknown answers to these and similar questions of vital import to the entire industry, the new man will earn the lasting gratitude of manufacturers, jobbers, contractor-dealers and his own central-station men alike. The entire electrical industry will gladly help him do this job.

A Peg on Which to Hang Publicity

IN NEARLY everything a public utility company does may be found something of benefit to the public, provided, of course, that the company is guided by the right motives. Sometimes these public benefits are indirect, sometimes direct; but, owing to our complex civilization, the public does not always know of the benefits or at least of its benefactors. Theoretically, the reward for making public benefits available is found in the doing, but practically there is advantage in having it known when activities create a public benefit as well as a personal one. Especially is this true in any public service where public friendship constitutes the keystone of business success. Utility companies recognize this fact.

Manifestly, patting one's self on the back for something one has done to benefit others is distasteful. Altruism, if it ever does exist unalloyed, is always suspected. None the less, many opportunities are afforded public utilities to show their interest in the public, and public attention may be called thereto with benefit if precautions are taken to avoid displaying any self-complacent spirit and if the company's name is only incidentally included. This, too, is well understood by executives and those in charge of public relations.

An example of "how to do it" is afforded in Michigan by the chain of signboards erected by the Consumers Power Company along important highways. One of these signs reads: "Eleven thousand white and Norway pines planted here; part of state-wide forest, fish and game conservation work of Consumers Power Company, serving a million Michigan people in 208 cities and towns." This reforestation will, of course, help to improve water-power conditions and will indirectly benefit the public in that manner, but the direct benefit will be to the nature lover, hunter, fisher and camper, to whom this sign appeals. In addition to benefiting the public in this manner, the Consumers Power Company has co-operated with the state conservation department in stocking fish in its hydro-electric storage ponds, over two million fish being stocked during 1926. Its enterprises on these lines provide hints which will not be thrown away.

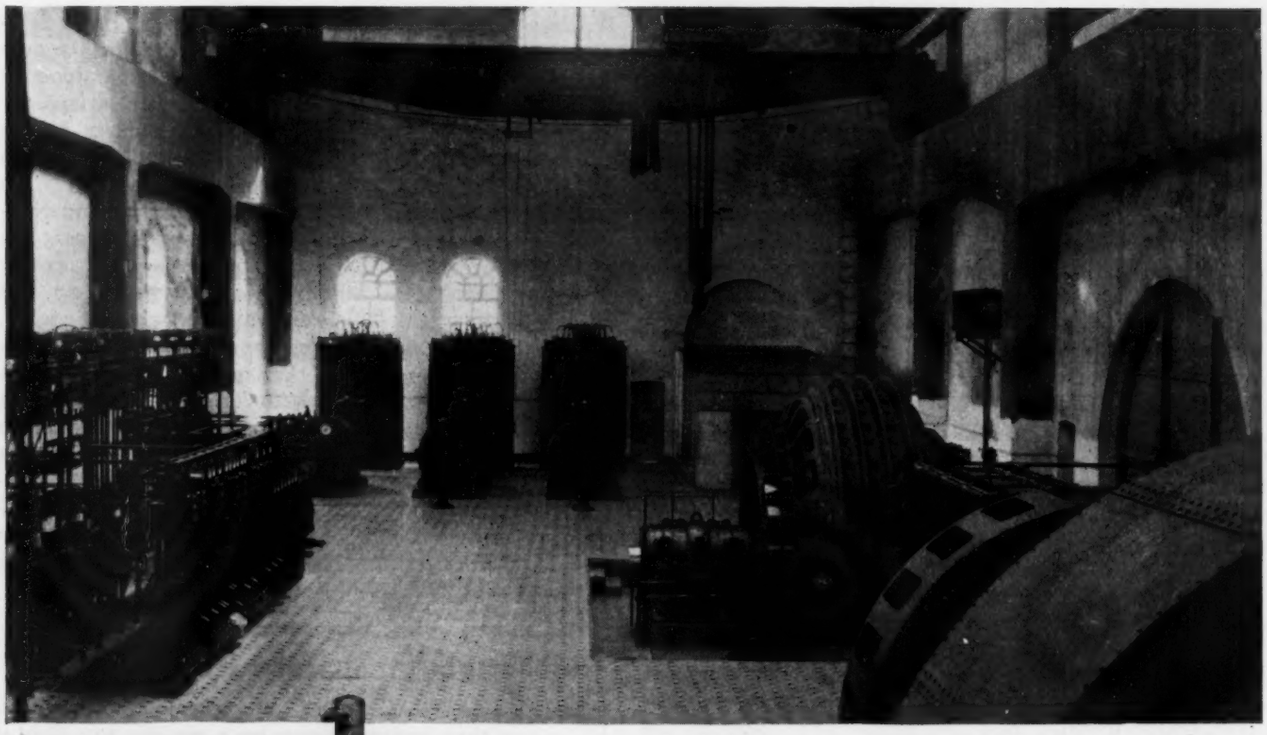
Daylight on Rural Electrification

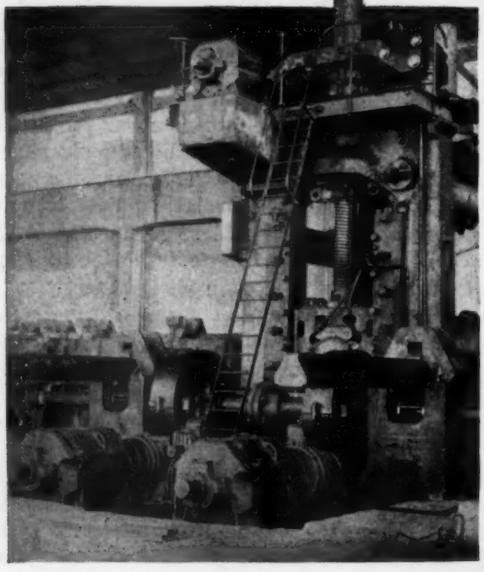
EXPERIMENTAL work on rural electrification shows that before it can be a reality two things must be brought about. There must be more for electricity to do on a farm, and there must be some way for the farmer to use in productive labor the time saved through electrification.

Every one can help to develop the rural situation to a point where electrification will become feasible. It may be that it will prove a powerful auxiliary in working out the national farm problem so as to put agriculture on a satisfactory business basis, and it is surely desirable to bring the comforts of electricity to the farm home. One is apt to forget that many million persons in this country still rise in the early morning and stumble around with a match to find an oil lamp or to light the kindling in the stoves or fireplaces. No wonder the trend to the city persists.

Although agriculture is a field for experts, there is opportunity to bring to farmers certain business principles which will give electricity more work to do and help the farmer to become more productive. Facts will show him that the hen, the cow and the pig rank with cotton, corn and wheat as income producers. Business principles will help him to diversify his farm activities and to study farm economics so that time and effort will reach the highest point in profit as well as in production. Business men should carry their principles to the farmer and add their quota to what the agricultural experts give him. Often a good program for local city business organizations and clubs would be the development of the business side of agriculture. Let each "Rotarian," "Lion" or "Kiwanian" adopt a farmer as a friend, get acquainted with the farmer's problems and give the farmer the benefit of his business experience.

Better business methods in farming furnish part of the answer as regards both getting more things for electricity to do on the farm and using profitably the time the farmer will save by means of electrification. Rural electrification for comfort will become easy when rural electrification shall become essential to profit.





Views of Spanish Steel Plant Equipment

A modern steel plant has just recently been completed at Sagunto, Spain, in which 35 cars of electrical machinery alone have been installed. Blooming mill, structural mill and plate mills have a connected power rating of well over 16,000 hp.

At top—General view of the blooming mill substation, showing part of the cover over the flywheels, the 5,000-hp. motor, the switchboard and switch structure and the rotary converters and transformers in the background.

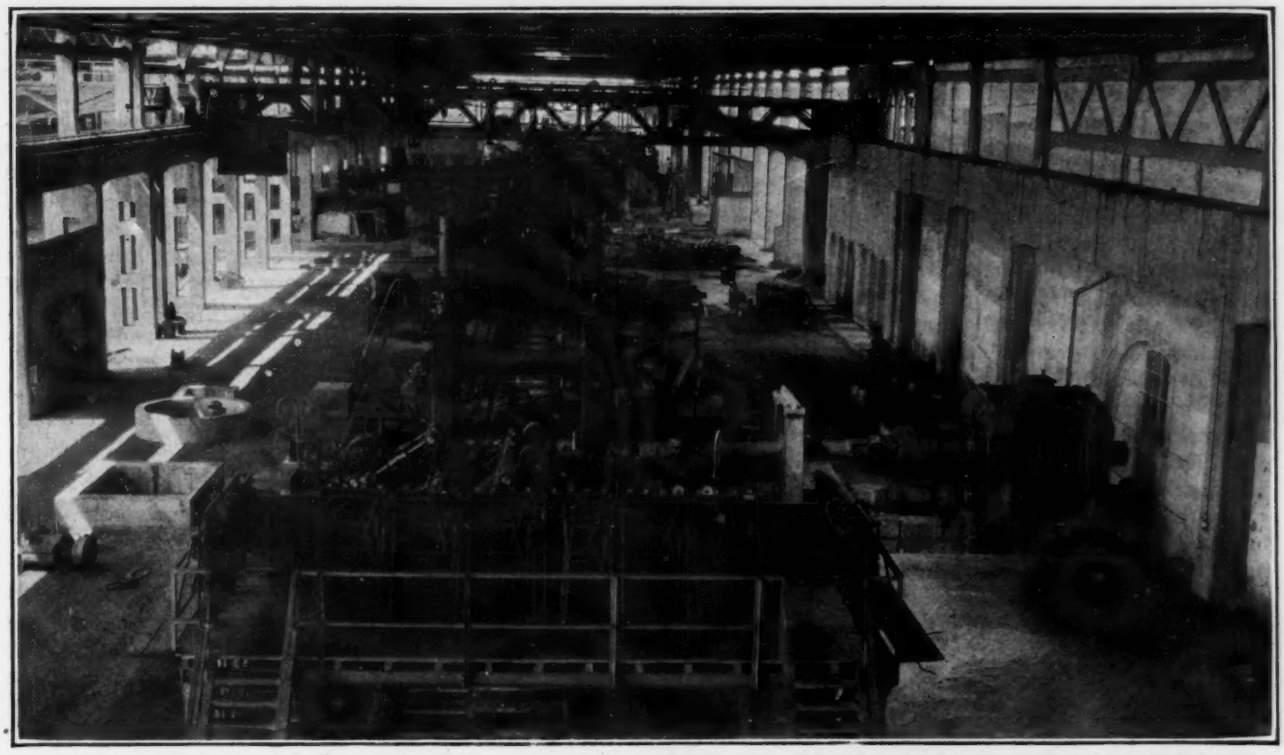
Center—Manipulator drive, showing two 100-hp. motors coupled to worm reductions. These are for one side of the mill.

Below—Tilting hook drive, mounted on manipulator carriage.

Modern Steel Plant at Sagunto, Spain

Consists of a Completely Electrified Blooming Mill, Structural Mill and Plate Mills, Power House and Substation—Electrical Equipment Comprises More than 90 Motors Totaling Over 16,000 Hp.

By C. A. RAUNICK
Erection Engineer, Service Department,
Westinghouse Electric & Manufacturing Company



GENERAL VIEW OF BLOOMING MILL, SHOWING AUTOMATIC CONTROLLERS INSTALLED ON OPERATOR'S PULPIT IN THE FOREGROUND

ON JAN. 28, 1924, a shipment of a 35-car train of electrical machinery was made to Sagunto, Spain, for the erection of a modern steel plant. At that time this was the largest single shipment of electrical equipment to leave the Westinghouse works consigned to a private company. Although this shipment was handled four times while en route and was in transit almost two months, only one piece of apparatus was received broken, that being a section of slate on the field control panel for the 5,000-hp. reversing motor.

The armature of the 5,000-hp. reversing motor for the blooming mill, weighing 42 tons without the shaft and coupling, was the heaviest piece of apparatus contained in the shipment. In order to transport the three flywheels, which weigh 30 tons each and are 14 ft. in diameter, from the docks to the substation, it was necessary to construct a special cradle of two 14-in. I-beams resting on two flat cars in such a way that the wheel could be carried between the two cars in a vertical position.

The blooming mill main drive equipment, pictured opposite, is located in the blooming mill substation. It consists of the flywheel motor-generator set, comprising one 5,000-hp. wound-rotor induction motor, 5,250 volts, 368 r.p.m., for driving the unit, the three flywheels, all of which are assembled on one shaft, and two direct-current generators, one of 3,500 kw., 700 volts, which furnishes power for the blooming mill main drive motor, and the second generator of 3,000 kw., 700 volts, which furnishes power for the 28-in. structural mill main drive motor.

The 5,000-hp. reversing motor used to drive the blooming mill has a maximum torque of 1,080,000 ft.-lb at 50 r.p.m., the maximum speed being 120 r.p.m. The armature of this unit is 12 ft. in diameter and weighs 62 tons complete with shaft and coupling. It was necessary to handle this armature on a crane having a rating of 45 tons.

A four-unit, five-bearing exciter set is used to supply the shunt field excitation for the reversing motors and the 3,500-kw. and 3,000-kw. direct-current generators. The motor driving this unit is of the 180-hp., 500-volt, 50-cycle induction type and receives power from a three-phase, step-down transformer of 25-kw. capacity, 5,250 volts to 500/250 volts. The direct-current exciter gen-

erator has a capacity of 90 kw., 125 volts. In addition to supplying the field excitation, this unit also furnishes power to operate the automatic controllers for generators and reversing motor fields. Two variable potential exciters of 15 kw. each are assembled with this unit.

The power is furnished for the auxiliary motors in the mill by three rotary converters installed in the substation. The units are of the six-phase, self-starting type with a rating of 1,000 kw. at 550 volts. The transformers for the converters are oil insulated, air cooled and provided with two external oil-circulating radiators. These transformers are three-phase, 5,250-volt, primary to six-phase, 407-volt, secondary type.

The alternating-current switching apparatus is of the hand-operated, remote-control type, consisting of eleven sections. The direct-current switching consists of three converter panels and three distribution circuits, equipped with single-pole knife switches and automatic circuit breakers.

INSTALLATION COMPLETED IN RECORD TIME

The installation of all the equipment in the substation was completed, tried out and ready to operate in four months' time. This includes the completion of the foundations for the 5,000-hp. motor, which required 32 bolts imbedded 10 ft. into the foundation; excavation and construction of foundation for the flywheel motor-generator set; assembling the 5,000-hp. armature on its shaft, and assembling the 30-ton flywheels on their shafts.

As the ground level in the substation was from 2 to 3 ft. below the final floor level, it was possible to install all of the conduit without excavating. The alternating-current switch structure and the entire switchboard were erected on brick piers, which permitted the placing of the conduits and the setting of the bell cranks for operating the oil circuit breakers.

In the 40-in. blooming mill proper there has been installed a total of 21 mill-type motors having a total rating of 1,405 hp. All of these motors are controlled with automatic controllers and two-point master switches. The mill approach table is divided into two sections and is operated by two 65-hp. motors. The main tables on the front and back side of the main rolls are operated by four 100-hp. motors, using two motors for each side of the mill, one motor being coupled to each end of the pinion shaft of the reduction gears. With this arrangement very rapid acceleration of the table rolls is provided and either motor is of sufficient capacity to operate the table alone in case of a failure in the other motor or controller. The manipulator guides are operated by four 100-hp. motors, two motors for either side of the mill. These motors are coupled to worm drives, having a reduction of 24 to 1.

The shaft of the worm wheel is coupled to a lay shaft, on which is assembled two pinions engaging with a rack that operates the manipulator guide. These motors are also operated in parallel similar to the main tables. The turnover or tilting hooks for blooms are placed on the right-hand front-side manipulator guide and are operated by a 40-hp. motor through a worm reduction gearing of 24 to 1. The tilting lever for slabs is placed on the left-hand front-side manipulator guide and is driven by a 60-hp. motor through a worm reduction of 24 to 1. The screw-down is operated by two 60-hp. motors. The run-out tables to the shears are divided into three sections, which are operated by three 65-hp. motors. The shear dipping table is equipped with a 37-hp. motor, and the shear measuring device is operated by a 12-hp. motor.

The 5,000-hp. motor driving the mill is operated continually with peaks of 35 to 40 per cent overload with perfect commutation and no evidence of sparking. The motor is controlled with a six-point master and a system of foolproof relays that prevents the operator abusing the motor. The motor speed is controlled by regulating the direct-current generator voltage with the first, second and third contacts on the master switch, maximum voltage and maximum torque being obtained on the third point of the master and additional speed obtained by inserting resistance in the shunt field circuit of the motor by means of the fourth, fifth and sixth contacts of the master. This motor is capable of coming to a stop from full speed of 120 r.p.m. in four seconds, and reversing from full speed forward to full speed reverse in ten seconds' time.

The 28-in. structural mill is driven by a 3,750-hp. direct-current reversing motor similar to that of the blooming mill, delivering maximum torque of 8,800,000 ft.-lb. at 70 r.p.m. and having a maximum speed of 150 r.p.m.

Although the structural mill is a three-high mill, the main motor is of the reversing type. This is very convenient because it permits the reversal of the mill for the purpose of backing out a cobble and also provides a very wide speed range, which is an advantage, since it becomes necessary very often to operate the motor slowly in order to have the blooms enter the rolls on the heavier passes.

AUXILIARY ELECTRICAL EQUIPMENT

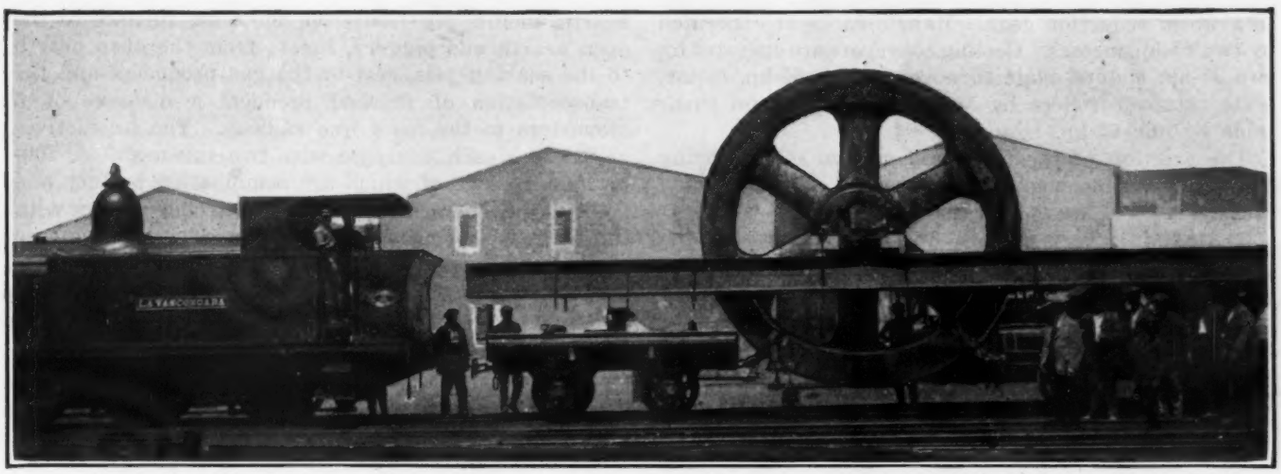
The auxiliary motor equipment for the structural mill consists of 43 motors with a total rating of 1,848 hp.

The slab transfer drive is operated by a 65-hp. motor, the slab pusher by a 37-hp. motor and the bloom transfer drive by a 65-hp. motor, approach table to the reheating furnace by two 37-hp. and approach table to the structural mill by three 60-hp. motors. Each of the four traveling tilting tables is equipped with a 60-hp. motor on the travel drive, a 60-hp. motor on the tilting drive and a 40-hp. motor on table roller drive.

The run-out table to the hot saw is operated by a 32-hp. motor and for the hot-saw tables there are two 37-hp. motors. The cooling bed is equipped with four 37-hp. motors on the rack drive and four 65-hp. motors on the skid drive. The cooling bed is designed to operate in two sections, so that there are two motors for each operation on each section of the bed.

In addition to the main cooling bed for rails and shapes, a bar-cooling bed has been installed for small square billets. This includes a shear run-out table operated by a 65-hp. motor; a bar piler roller, driven with a 30-hp. motor; bar piler traverse drive, 30-hp. motor; bar kick-off drive, 12-hp. motor; and a bar-cooling bed drive, 60-hp. motor.

The reheating furnaces for the structural mill are of the continuous type, and with the exception of times when the blooming mill is out of service, the hot blooms from the shear are charged directly into the rear of the reheating furnace, discharging reheated blooms from the front end. There have been occasions when the blooming mill has received real hot ingots and the rolling time in the mill has been very short. With this condition blooms have been taken from the shear direct to the structural mill. This has resulted in an increase

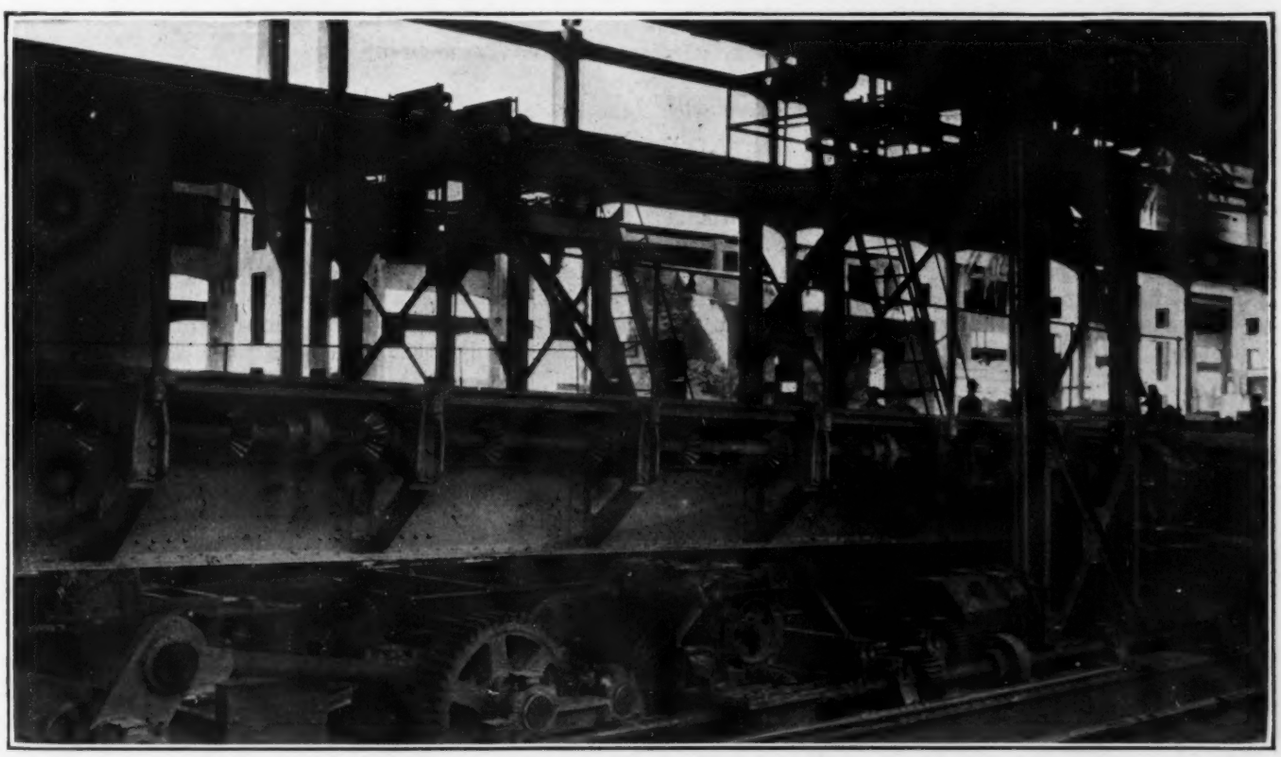


SPECIAL CRADLE USED FOR TRANSPORTING THE THREE 30-TON FLYWHEELS FROM THE DOCK TO THE SUBSTATION

of load of 10 to 15 per cent on the main drive motor. The mill rolls chiefly rails of 45 kilos to the meter, or 90 lb. to the yard, and has turned out 460 tons of rails in ten hours; also I-beams up to 14 in. have been rolled.

The 111-in. plate mill is equipped with a 3,000-hp. type CW wound-rotor induction motor, 5,250 volts, 735 r.p.m., driving through a reduction gear of 14 to 120. The gear is 12 ft. in diameter and has 30-in. face. The pinion is cut integral with the shaft; two 8-ton flywheels of laminated steel are assembled, one on either end of the pinion shaft.

The auxiliary drive equipment consists of 22 motors having a total rating of 686 hp. Approach tables to the reheating furnace are driven by two 65-hp. motors, approach tables from the reheating furnace to the mill by two 65-hp. motors, receiving racks by one 60-hp. motor, tilting table lifting gear by two 60-hp. motors driving through a worm reduction gear; the tilting table rollers consist of two 60-hp. motors for the front-side table and two 60-hp. motors for the back-side table. The drives are so arranged that alternate rollers on the table are driven by one 60-hp. motor, the drive being located to one side of the table; the other half of the rollers are driven by a similar drive located on the opposite side of the table. The two separate drives are mechanically connected by one of the rollers having two pinions, one on either end of the shaft and engaging in the drives of both sides of the table. The screw-down is driven by two 60-hp. motors, the top main roll is carried in position by counterweights; the center roll, which floats between the two main rolls, operating against the bottom roll for one direction and against the top roll for the opposite direction, is carried on a counterweight and is elevated and lowered by the table-elevating mechanism. The slab turner assembled on the front side table is operated by a 12-hp. motor coupled



CLOSE-UP VIEW OF TRAVELING TILTING TABLE, SHOWING TRAVEL DRIVE AND TILTING DRIVE

to a worm reduction gear. Mangle racks are operated by two 65-hp. motors. Cooling conveyors are operated by two 37-hp. motors, plate turnover by one 65-hp. motor, plate turnover rollers by one 65-hp. motor and shear table by one 65-hp. motor.

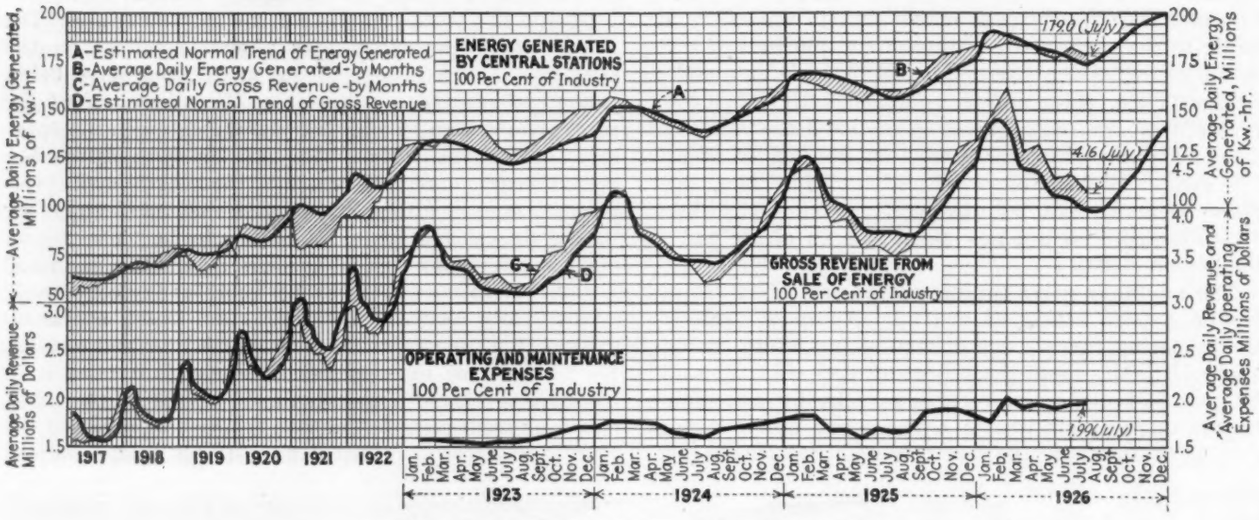
The erection of the plate mill section is just being completed and no steel has been rolled in this section to date.

The plant is very modern in every respect and the only place steam is to be found in the plant is at the power house, the waste heat boilers at the open hearth and the auxiliary boilers located at the gas producers for the various reheating furnaces.

Eight electric locomotives are used for handling the yard shipping, such as stock, lime and stone, to the open hearth, molten pig iron from the blast furnace to the open hearth and piggery, ingots from the open hearth to the soaking pits, coal to the gas producers and the transportation of finished products a distance of 5 kilometers to the main line railway. The locomotives are 30 tons each, equipped with two axle-mounted, 100-hp. motors, two of which are combination battery and trolley type, operating on a 550-volt trolley system with the battery floating across the line. These are in use at the open hearth.

Steam is being generated from blast-furnace gas and also by waste heat boilers at the open hearth. Electricity is generated by three 3,750-kva., 5,250-volt turbo-generators and is distributed through two three-phase lead-covered underground cables.

July Output Exceeds Last Year's by 11.7 per Cent


A-Estimated Normal Trend of Energy Generated
B-Average Daily Energy Generated-by Months
C-Average Daily Gross Revenue-by Months
D-Estimated Normal Trend of Gross Revenue
ENERGY GENERATED BY CENTRAL STATIONS
100 Per Cent of Industry
GROSS REVENUE FROM SALE OF ENERGY
100 Per Cent of Industry
OPERATING AND MAINTENANCE EXPENSES
100 Per Cent of Industry
1790 (July)
4.16 (July)
1.99 (July)
Average Daily Energy Generated, Millions of Kw.-hr.
Average Daily Revenue, Millions of Dollars
Average Daily Revenue and Average Daily Operating Expenses Millions of Dollars
1917 1918 1919 1920 1921 1922
1923 1924 1925 1926

OPERATIONS CONTINUE IN EXCESS OF FIVE-YEAR NORMAL

AN INCREASE of 11.7 per cent as compared with the corresponding month last year brings the energy generated by public utility light and power plants in July to a total of 5,545,764,000 kw.-hr., according to data reported to the ELECTRICAL WORLD. This output exceeds the estimated normal, based on operations for the past five years, by 3.8 per cent. The average daily output, as contrasted with that of June, shows a slight decrease, but this is entirely usual and is probably to be accounted for by the fact that while the two months differ in the number of calendar days, they have an equal number of working days, owing to the holiday in July.

Of the total output, 1,963,292,000 kw.-hr., or about 35 per cent, came from hydro-electric plants. This is an increase of 6.9 per cent over July, 1925, but a 10.4 per cent decrease from the preceding month. The decrease in available water power was made up by the steam plants, which show an increase of 14.4 per cent as against July, 1925, and of 8.2 per cent over June,

TABLE I—GENERATION AND DISTRIBUTION OF CENTRAL-STATION ENERGY IN THE UNITED STATES
(100 per Cent of the Industry)

Month	Kw.-Hr. Generated Monthly *			Estimated Distribution of Energy Generated										Energy Purchased by Public Utilities for Resale, Kw.-Hr.	
				Total Energy Consumption by Central-Station Customers, Kw.-Hr.		Energy Consumed for Lighting, Kw.-Hr.		Energy Consumed for Power, Kw.-Hr.		Energy Sold to Electric Railways, Kw.-Hr.		Energy Used in Intracompany Business, Including Line Losses, Kw.-Hr.			
	1926 Thousands	1925 Thousands	Per Cent Inc.	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands
May.....	5,436,704	4,812,865	+12.9	4,386,704	3,883,865	1,164,000	1,089,000	2,662,704	2,255,865	560,000	539,000	1,050,000	929,000	1,085,000	734,000
June.....	5,503,375	4,829,035	+13.9	4,441,375	3,896,035	1,152,000	1,067,000	2,747,375	2,306,035	542,000	523,000	1,062,000	933,000	1,087,000	698,000
July.....	5,545,764	4,966,266	+11.7	4,475,764	4,009,266	1,164,000	1,079,000	2,747,764	2,384,266	564,000	546,000	1,070,000	957,000	982,000	764,000

*Data on "energy generated" are those collected and published by the United States Geological Survey for all public utilities minus such data as are collected on energy generated by electric railway companies, reclamation service and manufacturing plants. The data are, therefore, for the electric light and power industry only.

TABLE II—CENTRAL-STATION FINANCIAL OPERATIONS FOR THREE MONTHS IN THE UNITED STATES
(100 per Cent of the Industry)

Month	Total Gross Revenue from Sale of Energy†			Estimated Distribution of Gross Revenue								Total Operating and Maintenance Expenses‡	
				Lighting Customers		Power Customers		Electric Railways		Other Public Utilities			
	1926 Thousands	1925 Thousands	Per Cent Inc.	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands	1926 Thousands	1925 Thousands
May.....	$133,800	$119,100	12.3	$85,600	$79,600	$34,200	$28,700	$4,800	$4,500	$9,200	$6,300	$59,800	$54,200
June.....	129,700	114,000	13.8	82,200	75,800	34,100	28,300	4,400	4,200	9,000	5,700	59,400	55,000
July.....	128,800	113,100	13.9	82,500	74,300	33,900	28,500	4,300	4,300	8,100	6,000	61,800	57,000

†Aggregate gross revenue from actual consumers, and sales to other public utilities for resale, involving a certain amount of duplication.
‡Do not include interest, taxes, depreciation or sinking fund.

1926. Analysis of the returns by sections shows very definitely the dependence of the ratio between hydro and steam-generated energy on the conditions of stream flow. Thus, only the South Atlantic and Mountain divisions report a larger output from water-power plants in July than in June, whereas every section reports an increase from its fuel-burning plants.

The amount of energy purchased for resale continues to grow, being for July nearly 30 per cent greater than it was a year ago and having in some months materially exceeded even that rapid rate of increase. In part owing to interconnections between systems having each its own generating equipment, and in other part accounted for by purchase at wholesale for redistribution where smaller companies have been able advantageously to buy rather than continue to generate, these mounting figures are evidence of the increasing economy possible by interconnections and by system operation so as to take advantage of all opportunities for efficient production.

TABLE III—OPERATING RATIO OF CENTRAL-STATION COMPANIES

Month	Operating Ratio					
	Steam Plants		Hydro Plants		Combined Hydro and Steam Plants	
	1926	1925	1926	1925	1926	1925
May.....	48.8	49.7	30.8	33.1	41.7	38.5
June.....	50.0	51.5	30.4	31.7	43.5	43.8
July.....	51.6	53.6	34.1	32.5	44.9	45.8

The operating ratio is lower than last year except in the case of companies depending solely on water power. Compared with June there is an increase in all groups, but this appears again to be entirely normal and is presumably to be ascribed to summer activity in construction. The change is not confined, apparently, to any one locality or group, as a study of individual data shows, but is due rather to a general rise in operating expenses without corresponding growth in income.

The operating revenue is 13.9 per cent higher than it was a year ago, and for the sixth month in succession exceeds the 1925 figure by more than 12 per cent.

Electricity Supply in Paris

IN ORDER to meet the increasing demand for electricity in Paris, the Compagnie Parisienne de Distribution de l'Electricité, in conjunction with the municipal authorities, has had no less than eight programs, known by the letters A to H, in progress. The "A" and "B" programs, which are now completed, comprised an increase in the capacity of the plants at the Saint-Ouen and Isay-les Moulineaux stations from 120,000 kw. to 330,000 kw.

The "C" program, at present in hand, consists of replacing the old 10,000-kw. generating sets with new ones of 12,000 kw., the frequency being at the same time changed from 41⅔ to 50, an alteration which will enable the distribution system to be linked up with a supply of power from hydro-electric plants. This work is not expected to be completed until the beginning of the year 1928.

The "D" program, which is also well in hand, consists of installing at the Saint-Ouen station three new turbo-generating sets rated at from 30,000 kw. to 35,000 kw., with the necessary boilers. The "E" program, also in progress, provides for the conversion of a direct-current five-wire distribution zone to alternating current. The "F" program, estimated to cost 144,000,000 francs, provides for an increase of the transformer plant to correspond with the enlarged generating capacity. The "G" program will comprise, on the one hand, an extension of the distribution system and, on the other, the establishment of two new transformer stations to handle energy at 60,000 volts. Finally, the "H" program provides for an increase of the capacity at the Sud-Ouest central station to 120,000 kw. It is estimated that the total cost of the eight programs as outlined will amount to the sum of 1,046,000,000 francs.

TABLE IV—OPERATIONS OF CENTRAL-STATION HYDRO AND FUEL PLANTS IN THE UNITED STATES*
(100 per Cent of the Industry)

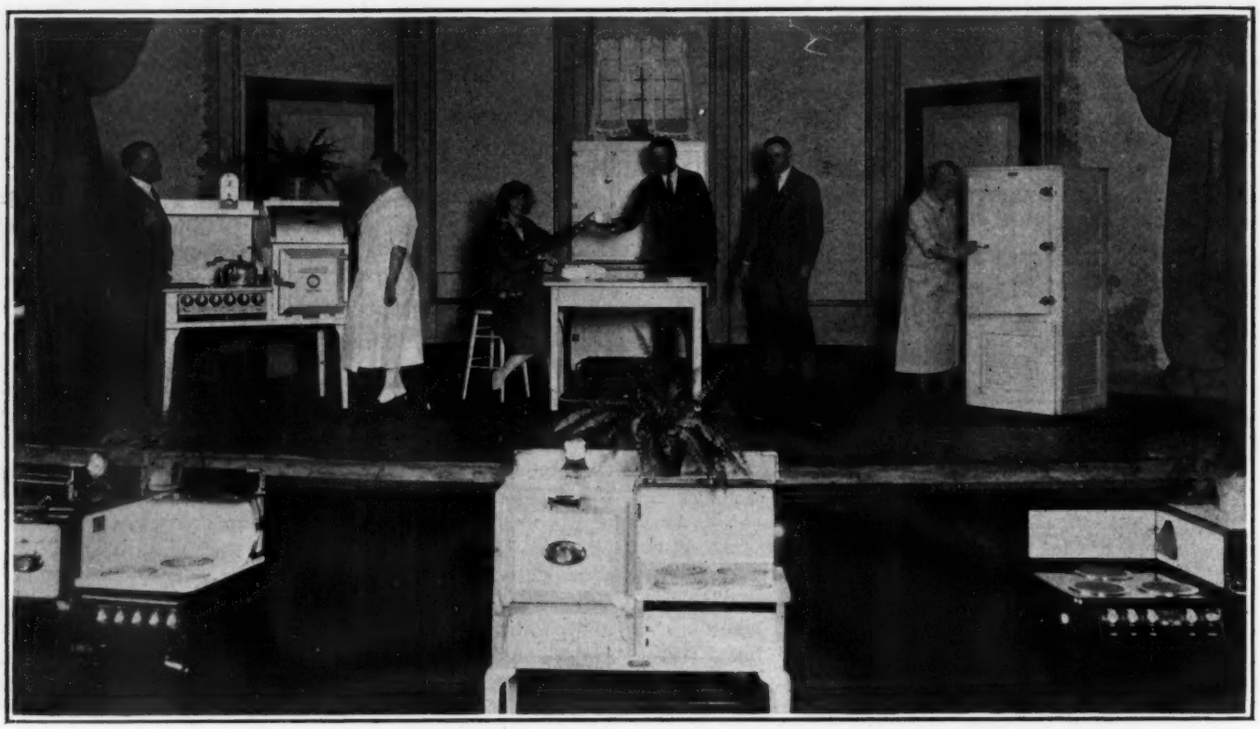
Month	Energy Generated						Fuel Consumption								
	Hydro-Plants			Fuel Power Plants			Coal			Oil			Gas		
	1926 Thousands of Kw.-Hr.	1925 Thousands of Kw.-Hr.	Per Cent Increase	1926 Thousands of Kw.-Hr.	1925 Thousands of Kw.-Hr.	Per Cent Increase	1926 Short Tons	1925 Short Tons	Per Cent Increase	1926 Barrels	1925 Barrels	Per Cent Increase	1926 Thousands of Cubic Feet	1925 Thousands of Cubic Feet	Per Cent Increase
May.....	2,266,305	1,992,231	+13.6	3,170,401	2,820,634	+12.4	2,720,082	2,579,798	+ 5.5	569,125	639,763	—11.1	3,712,226	3,434,604	+ 8.1
June.....	2,191,035	1,810,908	+20.9	3,312,340	3,018,127	+ 9.7	2,802,006	2,704,974	+ 3.6	591,009	755,692	—21.8	4,195,020	3,667,081	+14.4
July.....	1,963,292	1,835,021	+ 6.9	3,582,472	3,131,245	+14.4	2,973,118	2,771,100	+ 7.4	668,047	814,718	—18.1	5,066,523	4,180,741	+21.2

*As collected by United States Geological Survey. The data are for the electric light and power industry only.

Co-operative Electric Range Campaign

How the Duquesne Light Company, Two Manufacturers, Two Jobbers, Twenty Dealers and Two Electric Leagues Sold Electric Ranges Under Difficult Conditions

By H. W. EWALD
Manager Sales Promotion Duquesne Light Company, Pittsburgh, Pa.



SCENE FROM ELECTRIC RANGE PLAYLET "THE WAY TO A MAN'S HEART"

WHEN the Duquesne Light Company decided to conduct an electric range campaign early this year, it was confronted with a number of perplexing problems. Although the company serves nearly 200,000 residential customers, there were but a few hundred ranges in domestic use because of the unusually low rate for natural gas supplied in the territory. In the Beaver Valley district, where it was planned to introduce electric ranges, a survey showed only about 25 in use among 18,000 residential customers. Most of these 25 ranges were in one small town which had experienced a gas shortage a few years ago. Only two of about 25 electrical dealers in the district stocked electric ranges, and one of these had had a range on his floor for more than a year without making a sale. Interviews with dealers, salesmen and customers indicated that little or nothing had been done to advertise the advantage of the electric range. Dealers were of the opinion that the electric range would be difficult to sell in quantity because of the low gas and coal rates in spite of the 3-cent rate for energy for cooking. Much pioneering work would be necessary to change the public's attitude toward the range. In addition to this, the towns comprising the campaign area are composed chiefly of industrial workers in the iron and steel trades.

As the whole electrical industry interested in the sale, manufacture and use of electric ranges in the Pittsburgh district was partly responsible for the prevailing condition and as all would share in the future benefit of an initial campaign, it was decided to invite all interested parties to co-operate.

The Duquesne Light Company invited all the range manufacturers and jobbers in Pittsburgh to join in a conference, at which detailed plans of the campaign, in written form, were presented. The keynote of the plan was equal opportunity for all. Every one present was impressed with its fairness and many were moved to expressions of sincere enthusiasm. However, some of the manufacturers did not feel that the volume of immediate business was sufficient to warrant their co-operation and they withdrew.

At a special meeting of the Electric League of Beaver Valley the dealers were invited to enter the campaign. Their interest and enthusiasm were aroused to an unusual degree. Out of these conferences a definite plan of operation was formulated, which included forming

an executive committee composed of two members from dealers, jobbers, manufacturers, the electric league and the Duquesne Light Company. The plan provided for a division of responsibilities and expenses shared by each group as follows:

Duquesne Light Company.

1. Furnish and mail 18,000 invitations for cooking schools in five towns.
2. Furnish and mail Electric League range booklet, inclosed with letter from the president of the Electric League of Beaver Valley to the entire mailing list.
3. Address one broadside mailing piece for each range campaigned—namely, Universal and Westinghouse.
4. Furnish a card file of the 18,000 customers on the mailing list and divide the cards equally among dealers in each respective community.
5. Advertise electric cookery without mentioning any range manufacturer in a series of ten advertisements, each to be published in nine papers in the campaign area.
6. Arrange for large newspaper spreads advertising food products, utensils, etc., used at cooking schools.
7. Assist in the preparation and supervision of window displays for every interested dealer.
8. Carry the account, if desired, of all ranges sold on deferred payments, providing the account met specifications of standard contract of sale.
9. Assist in establishing a training school for salesmen and furnish to each student the book prepared by the Society for Electrical Development, "Retail Sales and Demonstrations of Electric Ranges."
10. Transport and connect ranges to be used in various cooking schools.
11. Make it possible for all dealers to use a flat installation price.
12. Rent auditoriums for cooking schools, provide orchestras for each session, printed programs and other literature, and assist in management and general activity of cooking schools.
13. Furnish ten salesmen to assist dealers in selling ranges.

Manufacturers and Jobbers.

1. Furnish ranges for cooking school, together with an experienced attendant at each session of the cooking school in the various towns.
2. Furnish experienced demonstrator to conduct cooking school on date set aside for respective range, the dates to be selected by drawing and each manufacturer to be given the same number of sessions in each town.
3. Furnish broadside and postage for respective range, the Duquesne Light Company to address broadsides and the broadside mailed first in each community to be decided by drawing.
4. Furnish mats and information for advertising in newspapers.
5. Furnish signs for dealers' trucks.
6. Furnish window trims for dealers and assist in trimming in order to obtain standardization.
7. Lend support to committee work and general activity of cooking school and campaign.

Dealer.

1. Have on hand at least two ranges, one to be displayed in window and the other to be kept on floor for demonstration purposes during the period of the campaign.
2. Enroll himself and as many of his representatives as possible in the training school for salesmen.
3. To do at least $25 worth of range advertising during the campaign period.
4. Equip each of his trucks with standard sign advertising the range for the total period of the campaign.
5. Lend support to committee work and general activity of the campaign.

SPECIAL FEATURES OF THE CAMPAIGN

At the first meeting of the executive committee subcommittees were appointed to handle details of the campaign. The chairmen were given memorandums outlining in detail the work expected of them. There was thus no duplication of effort and one man was responsible for each phase of the work.

The salesmen's training school was opened by a get-together meeting at which the complete plans of the campaign were outlined to more than 100 sales representatives. The special event of the evening was the presentation of an original playlet entitled "Sign the Order, Please." It portrayed the principles of range selling by contrasting the sales interview of an unsuccessful electric range salesman for the "Live Wire Electric Company" with that of the successful salesman for the same company. At subsequent meetings the salesmen were divided into groups for each respective range and instructed in the selling arguments and particular advantages of that range.

The advertising plan was arranged so that the public became interested first in the superiority and practicability of electric cookery and then in the specific advantages of the ranges being sold. Preliminary advertisements, under the name of the Electric League of Beaver Valley, appeared in the newspapers. The housewife received a booklet prepared by the Electric League of Pittsburgh, together with a letter from the Electric League of Beaver Valley. Next she received an invitation for herself and family to attend an entertainment and cooking school under the auspices of the league. The day after attending the cooking school she received a circular outlining the advantages of one particular range and informing her of a special price offer. A few days later she received a circular from another range manufacturer. There were other advertisements in the papers, window displays, etc.

DEFINITE PROGRAM AT EACH SESSION

Each session of the cooking school was opened by a short address of welcome by George Wolf, president of the Electric League of Beaver Valley. This was followed by a brief talk on saving the housewife work by the use of modern electrical appliances. Then a range playlet entitled "The Way to a Man's Heart," prepared by the cooking school committee, was presented.

The demonstrator then took charge of the school and prepared tempting dishes that were later served to the audience, which was invited to inspect the ranges on the stage. A large percentage of the audience accepted the invitation and asked many questions of the salesmen in charge of each range. Although each session was conducted by one of the range manufacturer's representatives, no mention was made of the manufacturer's name during the formal program, and both manufacturers had ranges on the floor with attendants. As the people came up on the stage they gathered in groups about the ranges and each manufacturer's representative made informal talks and answered questions concerning his range.

At the cooking schools a registration card was used that gave unusually good results. A copy of it is reproduced herewith, and it will be noted that the entry on the last line offers a splendid lead. The salesmen used these cards to great advantage and were particularly aided by the knowledge of what appliances the prospect owned. It was interesting to find that the majority of the people stated the appliance they would like to have next. Twenty-five per cent stated a desire for an electric range; 4 per cent, a refrigerator; 6 per cent, a washing machine; 5 per cent, a waffle iron, and so on. The high percentage for the range was taken to indicate that the schools were having the desired effect upon the audience, and the salesmen found that those who had witnessed the playlet were already

pretty well sold. The cards also gave valuable statistics for each city, such as the percentage of those attending the cooking schools who owned each of the various appliances listed. Seventy per cent of the audience in all the cooking schools filled out the cards in the proper manner. The cards were divided later equally among the dealers in each respective town.

The efficiency of the campaign work was greatly aided by the use of specially printed forms. The progress of the salesmen was followed by means of a daily report which each salesman executed and which showed the number of sales, number of interviews, a list of prospects visited and a short statement summarizing the results of each interview. To keep an accurate record of ranges on the Duquesne Light Company's system a service connection form was used that gave the date of connection, the make of range, name and address of customer, etc. To aid in compiling data on the cost of serving the range an installation form was used that shows the cost of the service line rearrangement, the cost of the overhead line rearrangement and other pertinent data. To assist the dealers in keeping data on their cost of range installations a special form was given to each dealer.

RESULTS OF THE CAMPAIGN

During the short intensive selling period of the campaign 75 ranges were sold to consumers, which is three times as many as existed in the area before the campaign started. Seed has been sown for future business and all those who participated predict a healthy increase in range sales during the coming year.

The faith of the dealers in the range business is significant. Not only has the public's attitude changed from indifference and skepticism to active interest and desire but the dealers themselves are "sold" on the idea of electric cookery as they were not before. In fact eight of them have bought ranges for their own homes. All of the twenty dealers in the campaign now stock ranges instead of only two prior to the campaign. Several are conducting individual cooking demonstrations and pushing sales by intensive efforts.

ELECTRIC LEAGUE of BEAVER VALLEY
COOKING SCHOOL AND ENTERTAINMENT
FREE PRIZE CARD

NAME Mrs. George Brown PHONE 580
ADDRESS 322 Centennial St.

Check Electrical Appliances you now have

IRON	✓	VACUUM CLEANER	✓
TOASTER	✓	WATER HEATER	
TABLE STOVE		CURLING IRON	✓
PERCOLATOR		WARMING PAD	
WAFFLE IRON	✓	ELECTRIC HEATER	
ELECTRIC RANGE		FAN	
WASHING MACHINE	✓	ELECTRIC REFRIGERATOR	

What appliance do you like best? Washing machine
What one would you like to have next? Electric Range

1

RANGE PROSPECT CARD

Recall Date ..... Own Home Yes No Servants Yes No
Size of Family {Small Large} Home Conditions {Excellent Fair Bad}
Kind of Prospect {Active Interested Not Interested} Objections {Initial cost Cost of operation}
Type of Range Favored ..... Remarks .....
Party interviewed if other than on reverse side
Salesman ..... Dealer ..... Date .....

2

YOU AND YOUR FAMILY ARE CORDIALLY INVITED
TO ATTEND A
Cooking School and Electric Range Demonstration
TO BE HELD AT
Ambridge Old High School, Ambridge, Pa.
Tuesday and Wednesday, April 20 & 21, 1926
AT 2:30 AND 8:00 P. M.
MUSIC AND ENTERTAINMENT — Electric League of Beaver Valley

3

FORM ELEC COMMERCIAL 8 1M 12 25

ELECTRIC RANGE
SERVICE CONNECTION

Commercial Manager,
Duquesne Light Company,
435 Sixth Avenue,
Pittsburgh, Pa.

Please be advised of an Electric Range Service Connection as follows:

Customer's Name .....
Address .....
Range Manufacturer ..... Type ..... Style No. .....
Total Capacity, Watts ..... Volts ..... Number of Wires {Three Two}
Number in Family ..... Service Connection Completed (Date) .....
Remarks .....
District ..... Superintendent's Signature .....

4

ELECTRIC RANGE CAMPAIGN
Salesman's Daily Report
(Prepare in duplicate)

..... Date .....
.....
Mr. H. W. Ewald, Manager
Sales Promotion, Duquesne Light Co.

Gentlemen:
A summary of my day's activities follows:
Started sales work at (Place) ..... (Time) .....
Stopped sales work at (Place) ..... (Time) .....
Number of interviews ..... Number of sales .....
Remarks .....

INTERVIEWS

NAME	ADDRESS	RESULT

Signed .....

*Name dealer associated with; original copy is for him and carbon copy is for Mr. Ewald. This report is to be made out every day even if salesman is not on job. In latter case give very definite explanation.

5

A GROUP OF FORMS USED TO GOOD EFFECT IN RANGE SALES CAMPAIGN

No. 1. Card found very effective in securing range leads.
No. 2. Range prospect cards distributed among dealers.
No. 3. Formal invitation to cooking schools.
No. 4. Form used to ascertain number ranges added to lines.
No. 5. Salesman's daily report helped to check the public's attitude toward the range.

Underground Conduit and Cable Construction in Boston

Effect of Congested Street Conditions on Conduit Design—Manhole and Joint Standards Used —Special Submarine Crossings

THE problem of reducing construction costs is frequently solved by the adoption of what have come to be called standardized methods and practice, by which is understood the use of selected designs and recommended procedure. In connection with the construction of underground conduits for electric light and power purposes, the use of standard methods in most instances has a limited range. Newly developed urban districts present attractive opportunities for the introduction of such methods and practice, which consist of structural elements placed uniformly under unchanging conditions surrounding their construction. On the other hand, much conduit construction must be carried out in well-established districts where streets are paved, where underground carriers of one kind and another already occupy most of the sub-surface area, and other obstacles, in the shape of projecting foundations, subway roofs, tunnels and a miscellany of obsolete contrivances, present problems that can be overcome only through the adoption of methods designed for the particular conditions that exist.

Boston, with its narrow and crooked streets under which numerous pipes, tunnels and conduits are located, affords an interesting study of construction methods wherein standardized practices are limited and special methods have been found necessary, and accordingly a description of the construction practice of the Edison Electric Illuminating Company of that city is of much interest.

In Boston the majority of the conduit construction projects are carried out by contract, the work being done by a well-known specialist in conduit construction under the direction and subject to the inspection of Boston Edison engineers.

As a rule all conduit lines are laid out parallel to street lines; but this practice, of course, is out of the question in the older districts, where the alignment is limited to the available unoccupied sections. The length of conduits between manholes rarely exceeds 500 ft., and distances of 300 to 450 ft. are usually recommended. Conduit grades are uniform for short distances; for distances around 300 ft. or more a broken grade, or hump, which permits drainage each way from a midway point, is desirable. Curves are eliminated where possible, in order to minimize resistance in drawing in cables.

Pick-and-shovel excavation methods are necessary in view of the underlying obstructions where excavation machinery, either of the ladder type or bucket type, would prove more costly in the long run.

SUBMARINE CABLE CONDUIT, NEPONSET RIVER

The standard Boston Edison conduit section is composed of fiber ducts, 5 or 8 ft. in length, laid in a 1:3:5 mixture. The coarse aggregate size is ½ in. for the partitions between the ducts and 1 in. for the base and outside wall sections. A plastic mixture produced in one and two-bag batches in a concrete mixer is placed in the open trench without the use of wall forms. Too much water—that is, too sloppy a mixture—is likely to float fiber ducts out of position, and for this reason the proper consistency is a matter of some importance.

The fiber ducts are spaced and aligned by means of spacers, of which there are two kinds. The comb type is well adapted to building up a section in layers and has been extensively used; whereas the recent introduction of the precast concrete spacer which is left in place (and accordingly becomes a part of the conduit section) has proved successful and economical from every standpoint. This latter type is easy to line up, is rigid and is a standard construction element that is well adapted to meet all existing conditions.

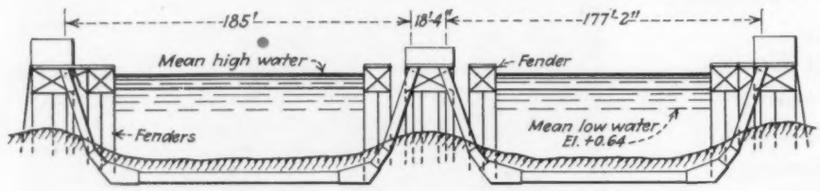
The joints in duct lines favored by the Boston company are of the sleeve type with tapered ends. This type of joint and the fiber material of which it is composed are satisfactory for the reason that fittings are easily made and breakage losses are less than would be the case if bell or socket joints were used together with precast concrete, tile or other refractory materials.

Manholes are generally constructed of brick. Concrete designs admittedly have many advantages, but the difficulty met in adjusting them to locations where irregularity of form is required excludes them in many cases. The shape recommended is the long, narrow form; the length varies, but 8 ft. in length, 5 ft. in width and a depth commensurate with pavement and sub-surface conditions are commonly specified.

The use of monolithic concrete conduit in which the

duct openings are formed in the concrete as laid has received attention from several companies, but has not been adopted by the Boston Edison Company owing to several inherent objections, although it has investigated this form of construction for several special cases.

Following the completion of the conduit, attention is next given to cleaning the ducts preparatory to drawing the cables. The rodding method is considered well suited for straight alignments. An innovation for cleaning ducts has been used by this company. It is a paper shuttle of conical form with string attached for withdrawing. This shuttle, which is $\frac{1}{4}$ in. less in diameter than the duct interior, is forced into the ducts by means of compressed air under 15 lb. pressure and pulled out by the string. This equipment has proved highly satisfactory in cleaning ducts.



STANDARD BOSTON EDISON 15-KV. UNDERGROUND CABLE JOINT

Cable joints conform in general to standard A.E.I.C. specifications. The use of cambric tape in alternating layers with paper tape is a feature that is commanding much attention on account of the durability of the cambric and the added strength of this fabric, which allows a greater pull in winding and consequently a tighter and more impervious envelope. The Boston Edison company has adopted joint designs for both 15-kv. and 25-kv. cables that embody this feature.

Installation tests are carried out after the contractor has completed his construction requirements. Recently revised, the specifications for 15-kv. and 25-kv. cables are as shown in the table opposite.

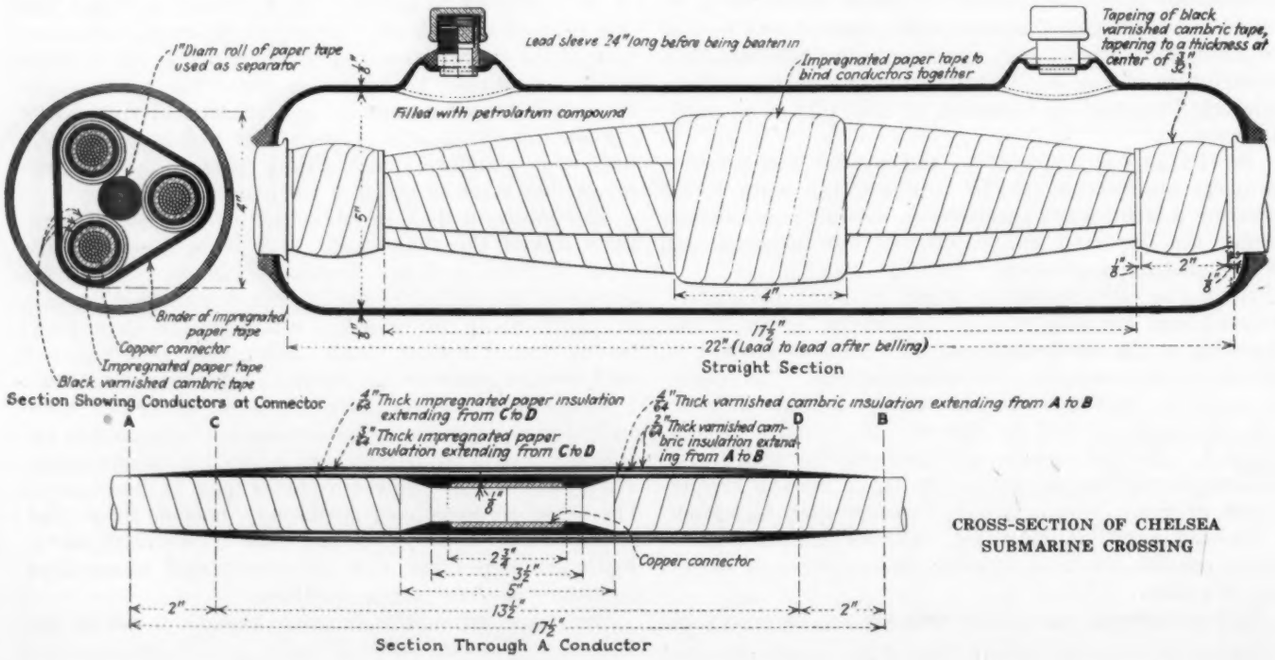
Of striking interest, as examples of special design in submarine cable crossings, are a number of structures placed under waterways during the past few years by the Boston Edison Company. A recent Neponset River submarine cable crossing is notable as the first of its kind. It consists of a steel shell-shaped "U" piece of rectangular cross-section with flanged-jointed tubular end connections, the latter 54 in. in diameter. Incased in this steel "U"-shaped yoke are twelve 4-in. fiber ducts imbedded in concrete reinforced longitudinally with 1-in. rods and transversely with $\frac{3}{4}$-in. hoops spaced on 24-in. centers.

The steel shell was erected on a timber platform and towed into place by two lighters. It was then lifted by means of hangers which reached under both horizontal and upturned projections at each end of the structure. After the structure was lowered into place the ends were pumped dry and the fiber ducts laid in concrete.

A later design, similar to the Neponset River crossing, was adopted for a crossing near the north drawbridge over the Chelsea River. The lengths of the two yokes were 177 ft. 2 in. and 185 ft. These yokes were lowered into a trench and anchored into place at each end. This type of concrete-steel shell crossing is both rigid and durable and is a great advance over the old method of laying loose cables on waterway bottoms.

15-Kv. Cables—
Factory test
72,200 volts a.c. between conductors, 15 min.
41,200 volts a.c. to ground, 15 min.
Installation test (80 per cent of above)
57,760 volts a.c. between conductors, 15 min.
32,960 volts a.c. to ground, 15 min.

25-Kv. Cables—
Factory test
93,000 volts a.c. between conductors, 15 min.
62,000 volts a.c. to ground, 15 min.
Installation test, (80 per cent of above)
74,400 a.c. volts between conductors, 15 min.
49,600 a.c. volts to ground, 15 min.


1"Diam roll of paper tape used as separator
Lead sleeve 24"long before being beaten in
Impregnated paper tape to bind conductors together
Taping of black varnished cambric tape, tapering to a thickness at center of 3/32"
Filled with petrolatum compound
Binder of impregnated paper tape
Copper connector
Impregnated paper tape
Black varnished cambric tape
Section Showing Conductors at Connector
17½"
22" (Lead to lead after belling)
Straight Section
A
C
D
B
1/64" Thick impregnated paper insulation extending from C to D
1/64" Thick impregnated paper insulation extending from C to D
1/64" Thick varnished cambric insulation extending from A to B
1/64" Thick varnished cambric insulation extending from A to B
Copper connector
2¾"
3½"
5"
2"
13½"
17½"
Section Through A Conductor

CROSS-SECTION OF CHELSEA SUBMARINE CROSSING

Cost Analysis for Electric Utilities

Relative Earnings of Residential Rates — Benefits Resulting from Increased Usage— An Inducement Rate Based on Cost Analysis

By Col. C. F. LACOMBE and W. S. LEFFLER
New York, N. Y.

IN TWO previous articles in the ELECTRICAL WORLD, of Aug. 28 and Sept. 18, it has been shown how cost analysis can be used to aid in the conduct of utility businesses and increase the "investment efficiency," and a description of the method used has been given. In this article it is attempted to show how a knowledge of these costs will aid in expanding our service and earning more per dollar of investment by finding the basic costs of each class of service and using this knowledge as a guide in the formation of rates that will sell more service of any type.

Throughout the utility industry there are many forms of rates, forms varying too much, in fact, which in terms of the over-all revenue are bringing in the requisite system returns. Many of these schedules of prices, particularly those for domestic services, do not develop the increasing use that is necessary to produce the desired return per dollar invested in that class. This condition, in turn, involves necessarily higher returns from other classes and may retard their full development.

Comparison of Earnings from Inducement and Non-inducement Forms of Rate.—From cases in which complete data were available it was found that companies using an inducement form of a residential rate based on cost analysis develop a higher rate of return from an increased consumption in the domestic service. In figures this may be translated into the statement that companies that have an average residence consumption of about 300 to 350 kw.-hr. per annum are earning from 4 to possibly 5 per cent on the dollars invested in this class, and their scales of prices are generally of the straight line type. Companies having an annual average usage in domestic service of 400 to 700 kw.-hr. use an inducement form of prices and are earning from 5½ to 8 per cent on this class of business. The relative showing of these two types of companies is given in the accompanying diagram exhibiting typical curves for each company of the trends of usage per month per customer in kilowatt-hours, the revenue per month per customer in dollars and the average unit price per kilowatt-hour each year. Company A shows the results of an inducement form of rate producing desirable growth and increased revenue.

The decreasing average unit price per customer encourages use and improves public relations.

The increasing average monthly revenue increases income and the net rate of return from the residence investment.

The increasing usage per customer improves load factor and decreases unit costs.

Company B is an example of the results obtained by a straight line form in many cases. It is seen that per customer the growth of this service is slight and the average bill has not increased in spite of a higher uniform unit price. As a matter of fact, the data of a number of utilities show that those companies using the inducement form of rate over a period of years have increased the percentage of consumption per customer three and one-half times as much and the percentage of revenue has increased more than three times that of companies using a nearly straight line form. Rate changes in the period were nearly equal for each type employed.

Advantages of Intensively Cultivating the Field of Domestic Service.—The domestic class of service contributes nearly 30 per cent of the total gross revenue of

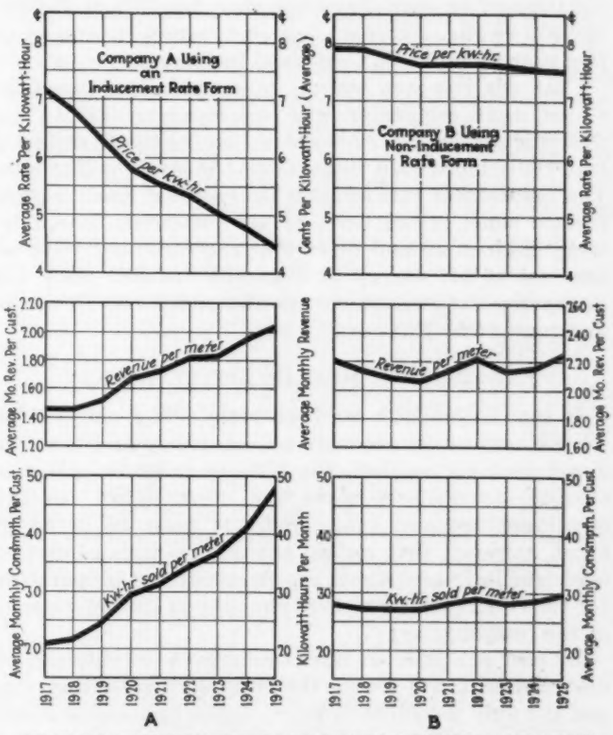

Company A Using an Inducement Rate Form
Price per kw-hr.
Company B Using Non-Inducement Rate Form
Price per kw-hr.
Average Rate Per Kilowatt-Hour
Cents Per Kilowatt-Hour (Average)
Revenue per meter
Revenue per meter
Average Mo. Rev. Per Cust.
Average Monthly Revenue
Kw-hr sold per meter
Kw-hr sold per meter
Average Monthly Cons'mpth. Per Cust.
Kilowatt-Hours Per Month
1917 1918 1919 1920 1921 1922 1923 1924 1925
A
B

DIAGRAM SHOWING TRENDS OF USAGE, REVENUE AND PRICE PER KILOWATT-HOUR

the light and power utilities and the increase in return as indicated would have a very marked effect in that this class would then bear a better proportion of its share of the net return without unduly burdening other classes with its deficiency in this respect.

The increased usage both in lighting and appliances that exists where the larger consumption is shown has also stabilized this most important class of business by replacing other forms of service in the home through the superior convenience of electricity at attractive prices. The assurance of higher net return earned from

30 per cent of the business through lowered unit prices is surely an insurance on the total net revenue against the fluctuations of commercial and industrial business as the tide of prosperity rises and falls. Another most important effect of the more attractive prices of the inducement form of rate is that customers are better satisfied and public relations necessarily much improved.

A recent broad survey has shown an average of 365 kw.-hr. used per home per annum at an average rate of 7.64 cents per kilowatt-hour. Out of 117 cities surveyed in this country only 48 are over this usage and in several of these it is known that small stores are included, so that the large majority of the usage is probably not more than 330 kw.-hr. per month per residence.

Since the residence revenue is more stable than that from any other class, it is apparent that any practical method of increasing the return from the residence business merits the closest study.

The largest field for increased business also lies in domestic lighting, power, cooking and heating service. About 14,000,000 domestic consumers now use about 1 kw.-hr. a day, and this lack of use lowers the usage throughout the whole industry per invested dollar to 10 kw.-hr. a year, less than one a month per dollar, in spite of the great industrial use of electric power. These figures are based on the generally assumed investment at present in power and light utilities of $7,500,000,000 and an estimated production for 1926 of 75,000,000,000 kw.-hr., based on figures given up to August of this year by the U. S. Geological Survey.

Cost analysis has shown in a number of cases, as stated, that companies with an inducement rate for domestic service sell more energy per customer and earn materially more than those using the straight line rate. The inducement rate obtains its so-called fixed charges from a small initial block of kilowatt-hours at a relatively high price and after that the consumer buys all the rest of his energy at a greatly reduced price and is thereby encouraged to use electricity for all useful and convenient purposes.

RATE CHANGES MUST BE RESULT OF STUDY

If then a company can earn from 6 to 8 per cent on 30 per cent of its business by one policy and but 4 to 5 per cent by another, the conclusion as to policy is obvious, particularly when the other direct benefits mentioned are also considered. It must be borne in mind, however, that radical changes in rates cannot be made suddenly or without careful study and preparation for the effect of the proposed changes on the net revenue of the company.

By cost analysis, an inducement form of rate can be designed that will follow the costs of domestic service and the unit reduction in price caused by increased load factor on safe lines, and by this means one can predict at a given load factor the net return on this service. A demonstration of this is given in this article.

One may picture the use of a kilowatt of capacity as the use of the dollars invested to obtain the capacity. Therefore as the return on the investment must be preserved above all else, the interest or return on those dollars must be assured. They are certainly better assured by the more equitable division of costs and relative earnings from properly designed inducement and load factor rates than from schedules more or less empirically designed, which are very likely to have distorted the fair balance of returns from different classes by arbitrarily establishing prices not based on correct allocations of costs.

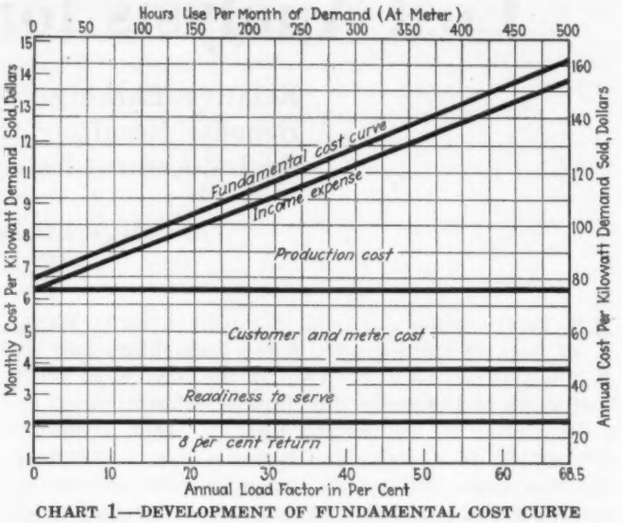

Hours Use Per Month of Demand (At Meter)
Monthly Cost Per Kilowatt Demand Sold, Dollars
Annual Cost Per Kilowatt Demand Sold, Dollars
Fundamental cost curve
Income expense
Production cost
Customer and meter cost
Readiness to serve
8 per cent return
Annual Load Factor in Per Cent

CHART 1—DEVELOPMENT OF FUNDAMENTAL COST CURVE

Close Knowledge of Costs Necessary in Developing Low Unit Prices.—As low unit prices are approached, costs must be carefully studied and equitably applied with consideration for several other important factors to be considered in making up an inducement scale of prices to sell more service.

This knowledge of costs is required by all types of rates and will enable us by more exact knowledge to simplify the form of the rate and reduce the number of forms. Both of these are desirable, as the industry cannot flatter itself that its rates are always intelligible to the man on the street. It is certainly easier to sell a customer your service by a readily understandable schedule of prices than by one involving a lot of complex and onerous conditions, particularly where the salesman can show that increased usage means lower costs of service to the customer.

If service is good and prices are attractive and decreasing with increased use, it should not be a difficult

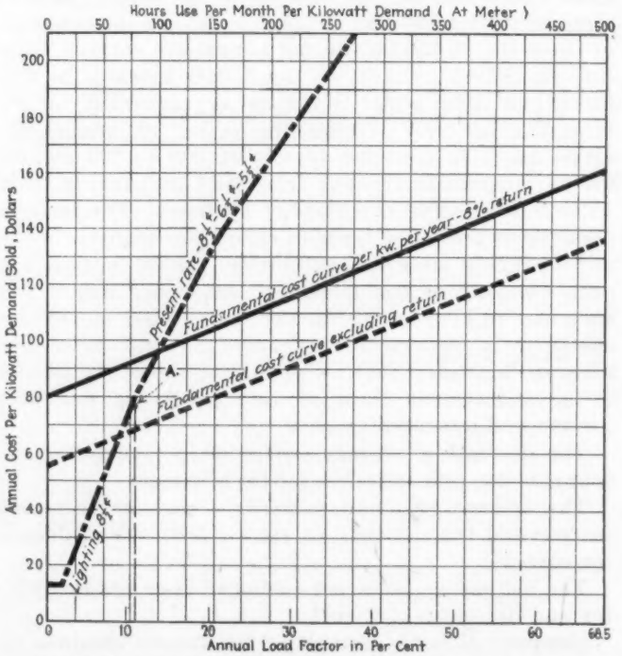

Hours Use Per Month Per Kilowatt Demand (At Meter)
Annual Cost Per Kilowatt Demand Sold, Dollars
Present rate-8¢+6¢+5¢+
Fundamental cost curve per kw. per year - 8% return
Fundamental cost curve excluding return
A
Lighting 8¢+
Annual Load Factor in Per Cent

CHART 2—RELATION OF STRAIGHT LINE FORM OF RATE TO FUNDAMENTAL COST CURVE

TABLE I—COMPARISON OF RATES OF RETURN EARNED AND COSTS TO SERVE EACH CLASS OF BUSINESS

Classes of Service	I. Investment	II. Per Cent	III. Gross Revenue	IV. Per Cent	V. Cost to Serve	VI. Per Cent	VII. Net Return	VIII. Rate of Return, Per Cent	IX. Return at 8 Per Cent	X. Excess or *Deficit from 8 Per Cent
Retail										
(1) Residence lighting	$20,550,000	42.5	$5,264,000	40	$4,442,000	48.5	$822,000	4.0	$1,644,000	*$822 000
(2) Commercial lighting and small power	14,240,000	29.4	4,079,000	31	2,192,450	24	1,886,550	13.2	1,139,200	747,350
Wholesale										
(3) Wholesale power and light	9,550,000	19.0	2,303,128	17.5	1,343,628	14.5	959,500	10.0	764,000	195,500
(4) Limited-hour service (off-peak)	1,100,000	2.2	726,000	5.5	572,000	6.3	154,000	14.0	88,000	6,000
Municipal Service										
(5) Street and building lighting	2,100,000	4.3	656,000	5	530,000	5.7	126,000	6.0	168,000	*42,000
(6) Municipal power	879,000	1.8	132,000	1	88,050	1.0	43,950	5.0	70,320	*26,370
Total	$48,419,000	100.0	$13,160,128	100.0	$9,168,128	100.0	$3,992,000	8.25 Over all	$3,873,520	$118,480

sales problem in a reasonable time to increase the customer's consumption. Such a form of rate, following costs, increasing usage by decreasing unit prices, raising the return per dollar invested and creating a balance of net earnings between classes equitable to all, will meet the requirements recently crystallized in the resolution of the commercial section of the National Electric Light Association for a draft of a promotional or inducement form of rate and the study of the influence of rate structure on the market for electricity. This subject has also been emphasized very strongly by Samuel Insull, S. Z. Mitchell and the late Charles E. Coffin at recent meetings and functions of the industry. In the light of these developments, the writers of this article may state that they have performed a fair share in demonstrating the necessity of these two requirements of the commercial section. They studied the effect of rate structure on sales and demonstrated the superiority in actual results of an inducement form of rate from the experience of a number of companies and reported the findings last year to one of the large associations within the industry.

The necessity and duty of intensively cultivating our markets is becoming a persistent issue within the industry and is attracting attention outside of it. The following quotation from the New York *Times* of June 11, 1926, bears strongly on this subject: "The [public utility] industry is now entering an era where increasing attention is given to the development of markets. Progress in the industrial field by public utilities has been notable in previous years, but some authorities contend that this movement is only just begun and that the utilities must now make efforts to increase the markets for their products in the same way as do the manufacturers of any commodity."

Establishing Attractive Schedules of Prices from Costs

Assuming that all the approved methods of modern salesmanship can be applied to the problem of increased sales per dollar invested and that the service sold is the best possible, the remaining element to effect sales is an attractive price decreasing with the quantity used. The processes of electric energy manufacture lend themselves well to such a schedule of sales prices. In the following example it is the endeavor to show how an initial or design schedule of rates can be constructed from costs and, from the design rate, a selling schedule of prices can be made for increasing usages or quantities that will decrease the price per unit with rising load factor and increase the earnings per dollar invested. In this theoretical example no other factors that may properly modify the form of the rate are taken into account.

To develop the example it is necessary to use certain data given in the Sept. 18 issue of the ELECTRICAL WORLD.

Table I is so taken and gives the final balance sheet of an example of cost analysis. This table has the general characteristics found where a straight line, non-inducement form of residence rate is used and where the number of customers is increasing with some rapidity. It is shown that 42½ per cent of the investment is used in serving the residence class, but the use of energy per customer is comparatively low, earning only 4 per cent on the investment and in consequence imposing an undue burden on the other classes of business.

The following will show how cost analysis can be used to design a rate that with properly applied sales effort would correct the obvious unbalance of class earnings shown in Table I, will increase the residence consumption per customer, reduce the average earned unit price to the consumer and aid greatly in promoting improved public relations. Further, it will stabilize the rate of return on the whole system by increasing the return from the most stable class—residence business.

Operating Balance and Development of the Fundamental Cost Curve for Residential Service.

1. From column 1, Table I, it is seen that the total investment allocated to the residence class was $20,550,000

2. From column 1, Table I, it is found that the total expenses necessary to operate the above investment in order to render the year's residence service amounted to..... 4,442,000

These expenses, as built up by the process of cost analysis, represent the total operating expenses that have been allocated to the residence class on the basis of (a) class demand, (b) number of customers or meters, (c) kilowatt-hours generated for the class, and (d) number of dollars of revenue handled, and comprises the following:

a. Expenses allocated on the basis of demand	$1,340,000
b. Expense allocated on basis of number of customers or meters.....	1,335,497
c. Production and all expense allocated on basis of energy output.....	895,536
d. Expense allocated on the basis of income from the class, such as annual franchise costs, certain taxes and those expenses that vary with the number of dollars of annual income	270,962
Total operating expense.....	$4,442,000

The above costs can now be translated into the respective components of cost to serve each kilowatt of demand sold at the customers' meters. The kilowatt of demand has been used throughout the history of rate making as being the most representative measure of both investment and operating cost, but it is obvious

that the following fundamental cost curve could be constructed on the basis of cost per room, if the average number of rooms per customer was known. Again, an area rate could be built up from the cost curve based upon a convenient unit of area.

3. As determined by observation, typical class metering, load curve analysis or calculation, the total kilowatts of non-coincident demand sold to all the residence customers served was .....65,445 kw.

Therefore:

4. Investment responsibility per kilowatt sold to the residence class = (1) ÷ (2).....$314 per kw.

Which gives:

Return—Nominal rate of return at 8 per cent of $314..... 25.12 per kw. per annum.
(8 per cent is assumed only as a convenient figure and not at all as a measure of value.)

Demand—Readiness to serve cost per kilowatt sold, which is: Demand component of operating expenses divided by total kilowatts sold to class at customers' meters; that is,

$1,340,005 demand expense / 65,445 kw. demand sold = 20.45 per kw. per annum.

Meter—Meter of customer cost per kilowatt sold, which is total meter and customer component of operating expenses divided by total kilowatts sold to the class at customers' meters; that is,

$1,935,497 meter expense / 65,445 kw. sold at meters, = 29.88 per kw. per annum.

Energy—Output or energy cost per kilowatt-hour sold, which is energy component of operating expenses divided by total kilowatt-hours sold to the class at customers' meters; that is,

$895,536 energy cost / 68,887,380 kw.-hr. sold = 1.30 cents per kw.-hr.

Income—Income cost, which is total operating expenses that are allocated on the basis of income divided by net income of the class; that is,

$270,962 income expense / $5,264,000 income (column 3, Table I) = 5.10 cents per dollar of income.

Fundamental Cost Curve (Annual Cost per Kilowatt Sold).—From the components of cost given above, the characteristics of what is termed the fundamental cost curve can be developed. After the curve has been laid down for any class of service it is obvious that any rate form that may be applicable to the class in question can then be superimposed and its effect and adaptability determined.

Chart 1 shows the construction of the fundamental cost curve as it is built up from the components of expense incident to delivering 1 kw. of service to the customer's meter, for any number of hours per month from 0 to 500—that is, 0 per cent to 68.5 per cent load factor. The nominal 8 per cent return on the per kilowatt investment has been included as an item of cost and together with the readiness to serve and customer expenses amounts to a fixed cost of about $75 per kilowatt-year. These elements are independent of load factor and will be much lower in companies where the residence business is served overhead rather than underground, and also where the residence load is all alternating current.

This case of exceptionally high fixed costs has purposely been chosen as an example in order to obviate any suggestion that an amplified domestic service schedule going as low as 2 cents per kilowatt-hour cannot profitably be employed by companies having the higher investment and service costs, the assumption being, of course, that the rate has been scientifically designed after a knowledge of costs and not before, also that the cost analysis has been properly interpreted on such major points as gas extension versus electric in combination companies, etc.

CO-ORDINATE CHARACTERISTICS

Components of cost:	Annual Cost per Kilowatt Sold At 0 Per Cent Load Factor	At 50 Per Cent Load Factor	At 100 Per Cent Load Factor
(1) 8 per cent return, per kilowatt.....	$25.12	$25.12	$25.12
(2) Readiness to serve, per kilowatt.....	20.45	20.45	20.45
(3) Customer and meter cost per kilowatt.	29.88	29.88	29.88
(4) Energy or output cost.....	.....	56.94	113.88
(5) Income cost.....	3.05	7.11	10.27
Total cost to serve.....	$78.50	$139.50	$199.60

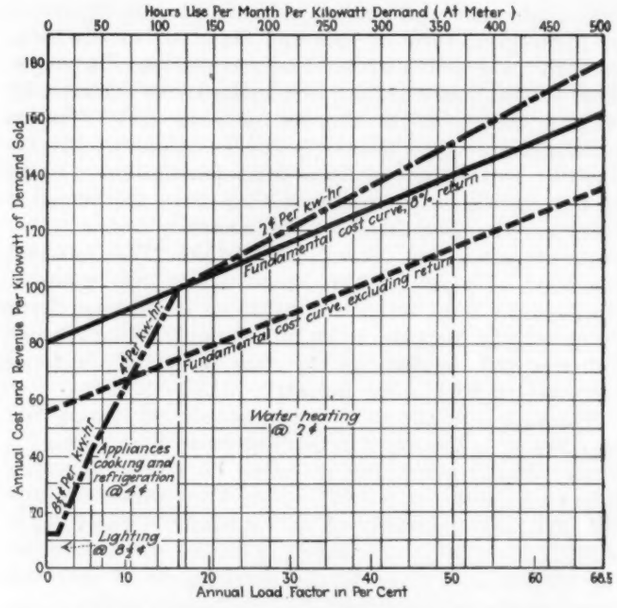


CHART 3—INDUCEMENT FORM OF RATE FOLLOWS FUNDAMENTAL COST CURVE

The question of gas or electric service is again emphasized because of the accuracy with which cost analysis will determine whether the B.t.u. equivalent can be sold more profitably by extending the gas or the electric sales in companies rendering the dual service.

The energy or output cost in Chart 1 is seen to vary directly with the amount of energy consumed, barring the negligible decrease per unit due to improved delivery efficiency at high load factor. Similarly the income cost varies with the amount of energy usage, inasmuch as it is a function of the amount of the consumer's bills.

Chart 2 shows clearly how inconsistent the broad block or straight line form of rate is with the progress of the company's actual cost to serve the customer's amplified requirements. The fundamental cost curve, which appears as a solid line, is the same as in Chart 1. The dotted line shows the cost curve when the 8 per cent return component is taken out. The space between the two lines therefore represents the range of cost within

which the customer must operate on any given rate to return the company some earning on its investment over and above actual operating expenses.

The progress of the present rate is shown in dashes and circles. The rate is as follows and is typical of the non-inducement form.

8½ cents per kilowatt-hour for the first 75 hours monthly use of the demand.
6½ cents per kilowatt-hour for the next 75 hours monthly use of demand.
5½ cents per kilowatt-hour for all excess.

A survey of the meter records of companies serving 20 per cent of the total residence customers in the country shows that the average load factor at which the residence lighting customer operates is about 10 to 11 per cent, as shown at *A*, or about 30 kw.-hr. per month on average individual demands of about 400 watts.

Under the rate quoted it is seen that the lighting usage returns about $80 per year per kilowatt gross revenue, but from Table I it is seen that the return on the investment is only 4 per cent.

Chart 3 shows the conversion of the non-inducement type of rate just described to an inducement rate structure, which more nearly follows the fundamental cost curve. The rate might be quoted in any of the three following forms and the results in increased consumption, gross revenue and improvement in rate of return from the class would be similar.

1. Wright Demand Type of Rate as plotted:
   8½ cents per kilowatt-hour for first 40 hours monthly use of demand.
   4 cents per kilowatt-hour for next 120 hours monthly use of demand.
   2 cents per kilowatt-hour for all excess.

These broad blocks have been chosen to meet the high fixed costs discussed under Chart 1.

It will be observed that for simplicity in quotation the 5-cent block for refrigeration, about 60 hours use per month, has been combined with the cooking block which can profitably be sold at 3 cents.

2. A room or area rate would appear as:
   8½ cents per kilowatt-hour for first 5 kw.-hr. per month per room.
   4 cents per kilowatt-hour for next 25 kw.-hr. per month per room.
   2 cents per kilowatt-hour for all excess.
3. A two-part rate consisting of a demand and energy charge would take this form:
   $2 per month per kilowatt of demand.
   4 cents per kilowatt-hour for first 100 hours monthly use of demand.
   2 cents per kilowatt-hour for all excess.

The practice among companies using the inducement form of rate is to make the minimum billing demand the lowest feasible.

It is apparent that a rate can be so designed that the rate of return will increase with improvement in load factor, and yet the follow-on prices be sufficiently low to induce the customer to increase his usage.

Where the original rate in Chart 2 is earning but 4 per cent, it is seen from Chart 3 that the return will grow to 12 to 15 per cent as more and more customers are converted to amplified domestic service. For the sake of simplicity in this presentation no endeavor has been made to discuss the decrease in meter and customer cost per kilowatt sold that will occur as the demands of the customers increase. Coincident with this, however, will come an increased distribution investment, which may or may not increase the fixed charges per kilowatt sold. It is safe to assume, however, that the customer component per kilowatt sold will decrease much more rapidly than the investment per kilowatt sold will increase, and therefore, Chart 3 does not in any way exaggerate the possibilities of the increased return of the rates quoted.

Letters from Our Readers

Allocation of Capacity Costs Again

To the Editor of the ELECTRICAL WORLD:

W. J. Greene's letter in your issue of Sept. 11 adds little, it seems to me, in support of his claim for the greater accuracy of his method of allocating capacity costs over the demand method. Mr. Greene admits the fact, which I think is entirely relevant, that no uniform or definite relation exists between load factors and diversity factors. He asserts, however, that this relation is not necessary in order to substantiate his claim that the unit demand cost of a high-load-factor consumer is more and the unit demand cost of a low-load-factor consumer is less than the unit demand cost for the average load factor of the system.

If by the consumer's "unit demand cost" he means the actual cost to the company of any particular consumer or class of consumers, some evidence is certainly needed to substantiate this claim, inasmuch as the alleged superiority of his method over the demand method is entirely dependent upon it. The only evidence in support of it is the case of the 100-per-cent-load-factor consumer, who obviously costs more than the average; but a mathematical formula, in spite of its exactly allocating all the costs in varying amount per kilowatt for different load factors, will not stand the test of accuracy unless it can be demonstrated in more than this single instance that load factors higher than the average actually cost more and load factors lower than the average cost less than the average.

Actual costs are directly affected by actual diversity, and not by "potential diversity," and the consumer with 100 per cent load factor is the only one whose load factor indicates anything concerning his actual diversity. We know that his diversity is unity, and this fact can be recognized under the demand method, without the necessity for also assuming that the cost of business with lower load factors than 100 per cent must therefore vary with load factors.

What Mr. Greene's method overlooks is the fact that consumers of the same load factor may have very different effects upon costs by producing very different diversity factors, owing to the tendency of certain kinds of business to concentrate their uses within a limited time or to spread them over a longer time. Retail lighting and retail power are examples of this. Furthermore, when we consider individual cases we find that a high-load-factor customer may so spread his use as to increase the actual diversity, whereas, on the other hand, a low-load-factor consumer may decrease it. It follows that any method which assumes that the capacity costs vary uniformly with load factors does not represent the actual conditions, and hence cannot be credited with greater accuracy than the demand method; on the contrary, it becomes misleading by its pretence of more nearly representing true costs.

A. S. KNIGHT,
Consultant.

Boston, Mass.

Central Station and Industrial Practice

Electric Heat Applied to Type Castings

THE metal from which type is cast is essentially a lead-tin alloy contained in a crucible that is built into the machine. It is important that this metal be maintained molten and at an exact temperature ranging from 550 to 850 deg. F. under various conditions of operation. This requires automatic control of temperature. Electric heat meets all of the requirements more fully than any competitive method, according to a report issued by the power committee of the N.E.L.A.

According to the report of the committee, the melting pots in use are so numerous and widely distributed that the exact load is not known, especially since they consume less than 1 kw. each on the average. Sales of electric pots by manufacturers to date would account for an average load of about 13,000 kw., or on a ten-hour basis a daily consumption of 130,000 kw.-hr. Metropolitan newspapers publishing morning and evening editions keep heat on 24 hours a day, seven days a week. At least one large installation maintained heat continuously without shut-down for several years, and presumably is still operating under the same schedule.

OPERATING DATA FROM SPECIFIC INSTALLATIONS

Location	Time in Use	Kw.-Hr. per Day
Line Casting Machines		
Evening newspaper..	6 a.m. to 4 p.m.	6.9
Metropolitan newspaper printing morning, evening and Sunday editions	Continuous except for shutdown from midnight Saturday to 3 p.m. Sunday	12.4
Small print shop.....	7 a.m. to 5:30 p.m.	5.3
Large print shop.....	7 a.m. to 4 p.m.	7.2
Magazine print shop	7 a.m. to 5 p.m.	6.2
Individual type caster-composition machine.		
Print shop	7 a.m. to 4 p.m.	12.3

It is estimated that all machines in use in the United States and Canada would, if heated electrically, provide an average load of 50,000 kw. Every machine in use where electricity is available should logically use electric heat now or in the near future. The field therefore is only 25 per cent covered and is growing nearly as rapidly as the supply of electric pots. It is claimed that special rates are not required to get the metal pot load, the usual power rates meeting those of competitive fuels.

Among the advantages credited to the use of electric heat are: (1) The type or slug has a better printing surface due largely to uniform temperature control; (2) uniform temperature control also permits an increase in output, there being less rejection, less maintenance attention, less time out, always ready for instant use, etc.; (3) working conditions are improved, there being no products of combustion to vitiate the atmosphere; windows may be opened in warm weather without affecting operations; a better workroom in every way is provided; (4) incidental savings, such as no additional ventilating equipment required or blower system to carry out products of combustion; better lighting and general working conditions.

The accompanying table gives operating data obtained from specific installations of varying kinds.

Kaplan Turbine Installation

IN ORDER to meet the increasing demand for power at its factory, the Steyermuhl Paper Manufacturing Company of Siebenbrunn, Austria, has recently completed a hydroelectric power plant on the River Traun. The head ranges only between 17 and 20 ft. and the maximum amount of water available is about 11,000 gal. per second. Up to recent times Francis-type turbines were mainly used for such installations, either of the vertical type with bevel gearing or multi-wheel turbines with horizontal spindles. Even with spiral bevel gearing it is not an easy task to secure silent running, and there is also a loss of efficiency in the transmission. Multiple-wheel turbines are also costly to install because of the special inlet chamber and evacuating pipes they require. In the end it was decided to install three Kaplan turbines and generators as being the best suited to meet the requirements of a plant such as that at Siebenbrunn, where for long periods the machines have to be run with a minimum water supply. The three turbines, which were constructed by the J. M. Voith Company of St. Polten, lower Austria, are of the vertical spindle type and are designed to develop 925 hp. each with a head of 17 ft. 9 in. and a water supply of about 3,630 gal. per second. With a head of 20 ft. 6 in. the power developed per turbine is increased to 1,100 hp. The turbines run at 250 r.p.m., a speed that permitted the use of direct-driven vertical spindle alternators of a less costly design than would otherwise have been necessary.

The turbines are located in a cement spirally shaped chamber below the level of the alternator room, in which is also arranged the turbine control gear.

The feature of the Kaplan turbines is that the angle of inclination of the blades of the screw propeller can be varied while running. The water reaches the propeller in a radial direction as in the Francis type, and between the impelling and impelled wheels is a free vertical space in which the water changes its direction from radial to axial. The propeller of the turbines has an outside diameter of 6 ft. 3 in., the central hub being of cast iron and the blades of special bronze. The turbine spindle runs in two guide bearings, one in the upper part of the turbine casing and one supported on a cast-iron cross-member. A flywheel is mounted between the turbines and alternator to prevent any shock on the generator resulting from variations in the water admission to the turbine.

LUBRICATION DETAILS

The weight of the rotating part of each set and the pressure of the water—a total of about 40 tons—is carried by a segment bearing with forced oil lubrication mounted in a crosshead above the alternator. The heated oil is circulated through a cooler and filter and thence back to the bearing. As the lubrication can be efficiently maintained only when the oil pump is working at a certain minimum speed and pressure, long running of the alternator below the safe minimum speed is prevented by

quickly bringing it to a stop by means of brake shoes acting on the under side of the flywheel rim.

When the reception tests were carried out, the guaranteed efficiencies of the turbines were exceeded by a considerable margin, 80 per cent being attained with a delivery of 1,210 gal. per second, 87.5 per cent with 1,980 gal., 87 per cent with 2,640 gal., as against the guarantee of 81 per cent and 85 per cent with 3,520 gal. Moreover, it is stated that the plant since started has given satisfaction and has maintained the efficiencies recorded in the tests.

A Telephone-Testing Installation

IN A recent issue of the radiotechnik supplement of *Elektrotechnik und Maschinenbau* of Vienna Herr M. H. Lichte describes a new method of testing telephones that has been adopted in the laboratories of the Mix & Genest Company of Berlin. The telephone to be tested and a standard telephone are arranged one at each end of a hollow cylinder from the center of which a tube is connected. At the other end of the tube is arranged a microphone or diaphragm. When the two telephones are excited by an alternating current and connected in such a way that the current creates magnetic fields in opposite directions, no sound whatever is heard if the two phones are of the same degree of sensitivity.

In practice a photometric bench and a measuring wire in an ordinary bridge are employed. To one of the extremities of the latter a source of alternating current is connected, the other terminal being attached to the telephones, which are themselves placed in series. Between the phones a flexible conductor is inserted, one end of which is connected to a contact that slides on the wire and can be moved along until all sound disappears, the ratio of the length of the sections of the measuring wire on each side of the contact being a measure of the ratio of sensitivity of the two phones.

The photometric bench may also be used to determine the effect of slight changes in the material incorporated in the telephone construction. Thus, for example, in using for the pole pieces of the magnet a piece of Swedish charcoal iron a sensitivity 15 per cent greater is obtained than when pole pieces are made of sheet iron.

Live Line Maintenance of Distribution Systems Established

San Joaquin Light & Power Corporation Shows Large Saving Through the Use of Live Line Tools—Better Service to Consumers Has Resulted—No Accidents to Workmen

BY H. H. MINOR
Distribution Engineer San Joaquin Light & Power Corporation, Fresno, Cal.

CHANGING DEAD-END INSULATORS WITH 11-KV. LINE HOT

MANY questions have been asked regarding the experience of the San Joaquin Light & Power Corporation with live line maintenance of its 11-kv. and 30-kv. lines. Questions frequently asked are:

"Does such work pay?"

"Is not the hazard to workmen too great to justify live line work on lines of voltages too high for the usual rubber protection methods?"

The best answer to these and other questions is the experience of this company with live line maintenance. About three years ago the problem of interruption to service caused by necessary maintenance work on 11-kv. distribution lines and the connection of new business to those lines was becoming very annoying to the company and its consumers. This annoyance was aggravated by failure of a certain type of dead-end insulator, of which there were several thousand in use. These insulators were failing by puncture from cap to pin, and it was evident that all would have to be replaced by insulators of better electrical characteristics. This would necessitate an interruption varying in time to every customer on the 11-kv. system.

COMPLETE SET OF TOOLS DEVELOPED

A certain "hot tapping machine" was tried out to obviate shutdowns due to connecting new customers to energized lines. However, it proved difficult to use in some cases and was limited in the size of wire that could be served. Appreciating the great difficulty experienced in arranging for shutdowns to do repair work, Chester C. Coon, in charge of this work, set about to develop a set of tools that would fully meet all requirements of live line maintenance work. From a crude beginning tools were gradually improved and new units added as the problems encountered showed their need, until a complete set was available that would answer for almost any job. The dead-end changes became extremely simple; taps were made and pin-type insulators replaced in a manner that could not be detected from hand work; air switches were replaced hot, eliminating interruptions to large loads; poles were set

TABLE I—RESULTS OF LIVE LINE MAINTENANCE ON SAN JOAQUIN LIGHT & POWER CORPORATION SYSTEM FOR 1925

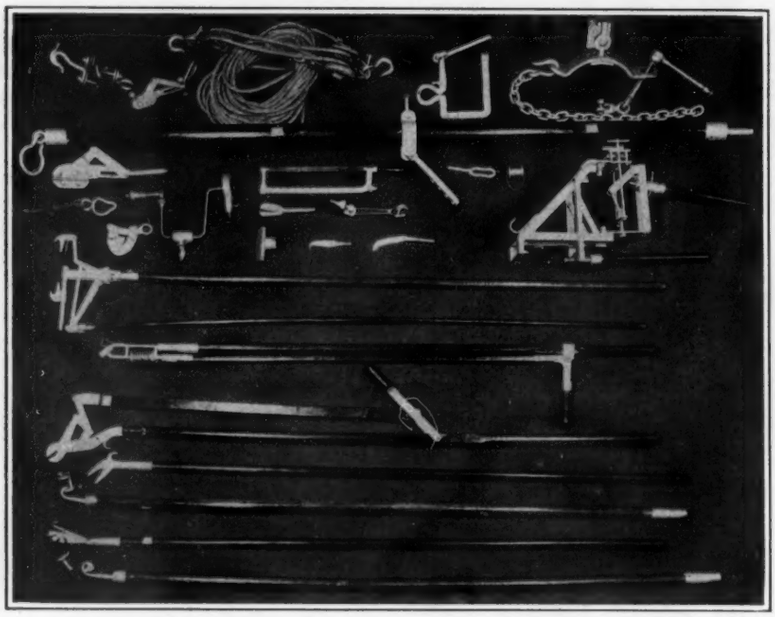
It will be noted that 572 less crew-days labor were required and 31,077 less miles were traveled by automobile than would have been the case had lines been killed to do the same work. Besides, service to 77,990 transformers remained uninterrupted. These figures represent not only a direct monetary saving but the much more important factor of good will due to satisfied customers.

WORK PERFORMED ON LIVE LINES, MILES DRIVEN AND TIME CONSUMED	
Dead-end insulators changed	5,139
Pin-type insulators changed	699
Fuse-contact insulators changed	214
Broken pins replaced	211
Temporary jumpers made permanent	2,586
Dead-ends changed pin to strain	90
Jumpers trimmed and replaced	2,720
Poles set in line	812
Miles driven to perform work	35,146
Crew-hours required	4,983

IF LINES HAD BEEN KILLED TO PERFORM SAME WORK	
Transformer installations out of service	77,990
Switches to operate	5,520
Miles to drive	66,223
Crew-hours required	9,555

in live lines and the lines tied in on them; maintenance jobs were no longer postponed until failure occurred, but the conditions were rectified when detected.

From the first the elimination of hazard to the workmen received the greatest attention. The treatment and test of all insulating handles were most carefully developed and checked. The tools were so designed that the workman was well in the clear of the hot lines at all times. In the instructions, safety and careful work were stressed. A regular routine of maintenance of the insulated handle was set up and periodic retest and retreatment provided. That such care has been rewarded is proved by the record.



COMPLETE SET OF SAFETY LIVE LINE TOOLS. ALL TOOLS PATENTED OR PATENTS PENDING

To date not a single accident of any kind has occurred to the men using the tools. Selection of men and training of crews have been important factors in making this record.

From the first complete and accurate records have been kept of routine maintenance work by the live line crews. These not only show the work actually performed but also give the time required and miles traveled in doing the work listed, also an estimate of the time and mileage that would have been necessary had the lines been killed to do the same work. The live line maintenance report for 1925 is shown in the accompanying table.

That live line maintenance pays is undoubtedly proved by the figures in this table. That the hazard to workmen has been practically eliminated is evident from the experience of this company. The saving in labor and mileage alone would more than justify live line methods, but the near approach to uninterrupted service that such methods make possible make them advisable even without such a saving. Company employees and consumers would consider it a step backward to discontinue live line maintenance on the San Joaquin system.

Nature of Eighth Iowa Meter Short Course

THE eighth electric meter short course conducted by the Iowa State College for utility metermen started Sept. 20 and continued through Sept. 24. Three parallel classes were conducted, the nature of which are indicated below:

Class A.— Fundamental metering principles, current and voltage, damping systems, 1½ hours.

Meter adjustments, full and light load, changing voltage and frequency, 1½ hours.

Meter constants, connections, methods of testing, calculating accuracy, 1½ hours.

Loading devices, safe connections, cutting around meters for testing, 1½ hours.

Use of rotating standards and loading devices, testing connections, record of test results, 1½ hours.

Three-wire single-phase testing, 1½ hours.

Demonstration of adaptability of three-wire single-phase meters to two-wire service, 1½ hours.

Inspection of jewels, care of bearings, gap clearances, register friction and its effects, 1½ hours.

Meter constants, gear and register ratios and their practical limits of value, 1½ hours.

Tester's personal errors, accuracy in practical work, quick methods of calculating accuracy, 1½ hours.

Single-phase and polyphase meters compared, register ratios, constants, adjustments, 1½ hours.

Simple polyphase testing, connections, loading, percentages for testing loads, 1½ hours.

Meaning of load value in polyphase testing, adjustments and special features, 1½ hours.

Polyphase testing on customers' premises, balance tests and lag adjustment, 1½ hours.

Voltage and currents in three-phase, three-wire meters, comparison with single-phase, 1½ hours.

Class B.—Meter constants, gear and register ratios, their limits of value, 1½ hours.

Testers' personal errors, accuracy limits in practical work, quick methods of calculating accuracy, 1½ hours.

Essential differences between single-phase and polyphase meters, register ratios, constants and adjustments, 1½ hours.

Polyphase testing, connections, loading, percentage loads used, 1½ hours.

Series and single-element polyphase testing, balance tests, 1½ hours.

Polyphase routine testing, using three-phase potential on meter during test, 1½ hours.

Voltage and current relationship in three-phase, three-wire meters by use of simple vector diagrams, 1½ hours.

Why lag adjustment is important on three-phase, three-wire meters, 1½ hours.

Low power factor tests on polyphase meters, how to determine lead or lag, connections for testing meters in service, 1½ hours.

Effect of lag adjustment on other adjustments, sequence of adjustments, accuracy limits allowable, 1½ hours.

Transformer type meters, high-capacity low-tension meter installations, 1½ hours.

Testing transformer-type meters, calculation of testing constant, 1½ hours.

Demand meters, principles of watt-hour meter demand registers, 1½ hours.

Testing demand meters and registers, 1½ hours.

Use of meter connection test blocks, 1½ hours.

Class C.—Practical use of vectors in metering problems, 1½ hours.

Use of two and three-element meters on various loads, 1½ hours.

Demand and kilovolt-ampere metering, 1½ hours.

Primary or high-tension metering, 1½ hours.

Temperature as it affects watt-hour meter accuracy, 1½ hours.

Meter department records, 1½ hours.

Standardization equipment and calibration laboratory, 1½ hours.

Inspection trip, 1½ hours.

Relays, operation and maintenance, 1½ hours.

The personnel of the short-course committee that co-operated with the

engineering extension department consisted of J. P. Jones (chairman), Waterloo, Iowa; L. D. Sample, Sioux City, Iowa; E. L. Fischer, Davenport, Iowa; Foss C. Hush, Lincoln, Neb.; F. D. Paine, Iowa State College, and V. L. Hein, Iowa State College.

Melting Steel and Gray Iron with Electric Heat

Small, Frequent Heats Possible—Metal Can Be Worked as Desired —Some Interesting Experiments on Temperature Control and Oxidation Losses Performed

THE power committee of the N.E.L.A., in presenting an advance report on the status of electric heat in industrial practices, had much of interest to record on its applications to the melting of steel and gray iron in the electric furnace.

The electric furnace is fast being adopted by the steel-casting industry and is generally accepted today as the best melting medium in steel-casting work. It has all the advantages of the cupola converter process, with none of its disadvantages, as the metal is poured on a clean hearth with a clean source of heat and under an atmosphere that can be made oxidizing, reducing or neutral, as desired. The temperature control and the control of the analysis of the metal are most accurate, as the mass can be worked as desired and the metal can be easily brought to sufficient heat for the small, intricate work in which quite a number of foundries specialize.

SMALL HEATS POSSIBLE

The electric furnace has an advantage over the open hearth in that it can make small, frequent heats with the metal sufficiently hot to pour small, thin section castings, and with corresponding economies in the use of floor space, folding equipment and the original investment in building, cranes, etc. The metal is thoroughly deoxidized and an excellent quality steel can be produced consistently, even though the cost of the scrap charge is considerably lower in first cost than the converter or open-hearth furnace can use. So far as the converter process is concerned, the electric furnace has the advantage of accurate control of temperature and analysis, much lower melting loss and a larger percentage of return in good castings due to less trouble with blow holes, slag inclusions and included oxide.

The electric furnace first came into use as an instrument for producing gray iron in this country about seven years after its introduction. During those first seven years it was used primarily for the production of tool and alloy steel and carbon steel castings. In 1917, however, several furnaces were put into operation making synthetic pig iron. This application of the electric furnace continued through the war until the year 1919, when the application changed to the production of iron for commercial purposes.

Some interesting experiments were carried out at a large industrial plant on the question of control and particularly the question of oxidation loss. Duplicate charges of pig iron were made up for the electric furnace and for the cupola with the following results:

	Gray Iron Castings	
	Electric	Cupola
Carbon	3.12	3.28
Silicon	1.69	1.63
Manganese	0.611	0.629
Sulphur	0.063	0.073
Phosphorus	0.56	0.55

In this instance, the electric furnace iron came out with practically no change in analysis, whereas the cupola iron had a pick-up in carbon and sulphur due to its contact with coke. Users who have had furnaces in commercial operation for a period of two to three years have found that they are able to maintain a predetermined analysis with surprising closeness and are further enabled, through the ability to work the heat, to make changes in the analysis as the heat progresses, carbon additions being obtained by adding retort carbon and broken electrodes, manganese and silicon changes being made by adding ferro-alloys.

In the matter of temperature control the electric furnace is most flexible. The temperature can be carried to any point required for the pouring of any type of casting, the only limiting factor being the melting point of the refractories that were used.

One great advantage is found in the reduction of the percentage of defective castings, particularly in the automotive industry. One plant reports that the chief advantages are, first, the ability to make better cast iron than is possible with a cupola; second, smaller percentage of defective castings; third, machining cost lower for tools; fourth, machine labor cost lower by reason of performing work on less castings turned out defective; fifth, peak rate can be lower, and castings are not hard; sixth, easier regulation of composition and temperatures; seventh, pouring facilities better, particularly on small casting jobs, no gang of molders waiting at the cupola spout for molten iron.

Another distinct advantage of the electric furnace is its ability to take care of emergency conditions arising in shops, where at times certain castings are required on very short notice.

Useful Remote Indicator

AUTOMATIC substations are used in several locations on the Edison direct-current system of the Union Electric Light & Power Company at St. Louis. It is convenient to have an indicator in the system dispatcher's office that will show the load on these substations. Engineers of the utility, in co-operation with engineers of the Weston company, worked out a comparatively cheap and yet very accurate and reliable installation to do this job.

A standard millivoltmeter is used as the indicator and is mounted on the dispatcher's board. This meter is connected over a leased telephone circuit to a standard shunt placed in the Edison automatic station. When the station operates, the millivoltmeter reads on its calibrated scale the magnitude of the load. One trouble encountered was eliminated cleverly. Any ground of the telephone lines put 125 volts maximum on the millivoltmeter. To prevent this a relay was placed on the meter circuit that will short circuit the meter when the 125-volt ground occurs. This relay operates on less current than is required by the millivoltmeter and has functioned perfectly when grounds occurred.

The installation has been in service some time and has given complete satisfaction. It is very much cheaper and more accurate than the other remote indicators used on the system.

Commercial Activities and Public Relations

Salaries or Commissions?

Recent Editorial on Question of How Power Salesmen Should Be Paid Elicits Differences of Opinion

THIS question raised in the July 3 issue of the ELECTRICAL WORLD might seem so old as to be unjustified at this time, except that commercial activities are commanding more attention in the utility field than ever before. Some commercial department heads maintain that the commission basis has worked out satisfactorily and is the only basis for stimulating real aggressive salesmanship. Just as many more executives contend that the commission basis or combination salary and commission cannot be satisfactorily applied in power-sales work.

Following are some comments from utility managers, executives in charge of commercial activities, and commercial managers:

"A power salesman not only should sell power but should be responsible for the relations with our power customers. In addition, the power salesman, or engineer as we call him, should look over the ledger accounts and see if the power customers are on the proper rate schedule. Assuming that the duties of the power engineer are threefold, as I have enumerated, I do not see how it would be possible to pay him on any basis other than a straight salary basis, due to the fact that if a commission were included he would naturally spend most of his time on activities that would bring him the largest commission." — *Vice-President and General Manager.*

"We do not pay our power salesmen commissions, but a straight salary per month per year. This salary is made large enough so that it is attractive and will hold the men in this connection. Most of the men in our power-sales department are men who have been with the company a long time and whom we have educated or who have been graduated from some technical school and have started in and worked up in this particular department."—*Vice-President in Charge of Sales.*

"We favor a commission basis in sales work where a salesman's activities can be definitely and conveniently measured. In a large part of central-station sales work, however, the disadvantages of the commission basis set forth in your comments are very prominent, and I do not believe a commission basis of compensation can be made satisfactory."—*Sales Manager.*

"Personally, I am fairly well convinced that almost any plan, soundly grounded, with factors properly evaluated, can be made to work satisfactorily under the proper kind of supervision. I use the word 'proper' advisedly, for the class of supervision required varies between wide limits with other factors." —*Sales Manager.*

The vice-president in charge of commercial activities of another company which has employed a salary-commission basis for power salesmen for twenty years declared that it has been entirely successful. He denied experiencing any of the objectionable results associated with commission compensation, saying that the absence of such objections is due in part to the type of men engaged for sales work, but chiefly to proper supervision.

Another vice-president in charge of commercial activities expressed the opinion that he "is on the fence" regarding salaries versus commissions, inclining toward commissions, as he believes they are the only basis of stimulating aggressive salesmanship.

There has been so much talk about utilities being monopolies in their territories that it has had a bad reaction on salesmen, this executive contends. Many join or grow up in the business believing that the utility is a monopoly and that there is no competition, consequently they do not seek business as if some one else might get it ahead of them.

Policies and Methods that Sell Refrigerators

Employed by R. L. PARKER
General Manager the United Appliance Company, Jackson, Mich.

Value of Business

Long-time profit on energy more important than sales profit.

Consumes approximately 840 kw.-hr. a year in June, July, August and September. About 93 kw.-hr. per month.

Ten refrigerators provide revenue equivalent of 300 washers, or 272 cleaners, or 500 fans, or 125 irons, or 214 toasters or percolators, or 750 curling irons.

Policies

Use sales profit in developing sales.

Do not cut prices; stimulate competition.

Sell all year around:
- Installed and operating.
- Small down payment and eighteen months' contract.
- Free trial for two weeks.

Methods

Advertise all year around:
- Newspapers most effective to impress general advantages and practicability.
- Back of bills, inclosures and fliers.
- Keep on display operating and filled with foods.

Sell general advantages of electric refrigerating first and particular unit last.

Emphasize cleanliness, sanitation, hindrance to bacterial growth and spoilage, dry atmosphere carries no odors, pure ice, frozen desserts.

Necessity in homes with children or nursing babies. Impress entire organization with value.

Encourage employees to purchase at cost plus carrying charges on time payments.

Pay employees commissions for prospects and cash bonus for sales.

Neat letters with stamped return envelope containing request for recipes bring good prospects.

Occasional campaigns of three months' duration with special inducements and advertising.

Salesmen

Refrigeration sales require specialized information.

Salesmen must meet customers on equal footing.

Classified newspaper ads effective in securing men.

Select and check customer calls made.

Pay salary plus commission.

Installation and Servicing

Customer satisfaction depends on satisfactory operation; operation depends on installation.

Select polite, clean, expert mechanics able to meet and talk with customers.

Instruct installers and service men at factory one week to two weeks.

TABLE I—RESULTS OBTAINED IN SERVING EIGHT MINNESOTA FARMS, APRIL, 1925, TO APRIL, 1926

No.	Name of Farmer	Kilowatt-Hours per Month: Maximum*	Month	Minimum	Month	Average	Kilowatt-Hours Consumed Annually for: Washing Machine	Cream Separator	Soft Water	Ironing	Well Water	Refrigeration	Ironing Machine	Range	Maximum Demand, Kw.: Maximum	Month	Minimum	Month	Connected Load, Kw.	Transformer, Kva.	Average Cents per Kw.-Hr.
1.	W. A. Cady	1,024	Aug.	78	May	239	7.5	24	..	....	....	....	....	751[1]	6.8	May	2	June	17.8	3	6.1
2.	A. M. Nelson	566	Nov.	74	April	241	14	18	..	....	89	....	....	571[2]	6.7	Nov.	4.5	Aug.	15.8	3	8.1
3.	A. C. Bryan	487	Sept.	125	Dec.	238	41	..	29	125	....	....	....	864[3]	7.4	Sept.	4.1	Nov.	17.4	3	6.1
4.	B. I. Melin	531	Sept.	135	March	273	28	..	12	....	253	764‡	213	581	5.4	Dec.	3.9	Nov.	23.4	3	5.7
5.	Nelson Bros.	658	Oct.	208	Dec.	322	18	39	12	80	148	371‡	....	2,248	7.9	Dec.	3.5	Feb.	17.4	3	5.3
6.	Henry Eckblad	530	May	46	July	153	23	11	84	....	....	....	90	.....	2.3	June	1.8	July	12	3	7.9
7.	Frank Miller	376	Oct.	98	Nov.	163	21	36	..	44	262	151	....	200[4]	8.1§	Aug.	3.0	May	18.8	5	7.6
8.	W. J. Bryan	709	March	26	Oct.	399	....	..	18	....	629†	..	72	1,820[5]	....	.....	....	....	....	....	5.1
	Average					253.5													17.5	3.28	

[1] Range disconnected two weeks.
[2] Range not used five months.
[3] Range not used four months.
[4] Range not used seven months.
[5] Tenant changed Oct. 4, 1925; last six months only 43 kw.-hr.
* The large consumption of Farm No. 1 in August, No. 4 in September and No. 5 in October was caused by threshing; that for No. 2 in November by corn husking, and that for No. 6 in April and May by incubators.
† Caused by a deep well, poor type cylinder and large herd of cattle.
‡ No 4 uses refrigeration year round, and No. 5 only during summer; No. 4 also has larger refrigerator.
§ Using 7½-hp. motor for husking corn.

Latest Experience with Red Wing Farmers

DATA that answer many questions regarding rural service have been made available by Prof. E. A. Stewart on eight of the farms served from the Red Wing (Minn.) experimental line. The data indicate that the average energy consumption per farmer has been developed to more than 3,000 kw.-hr. per year, an increase of 42 per cent in one year, the maximum being about 4,000 kw.-hr. and the minimum about 1,840 kw.-hr. The average monthly consumptions (Table II), including different classes of use, are particularly interesting as showing that an average of 170 kw.-hr. per farm is used, excluding water heaters, large motors, ranges and incubators, whereas these uses increased the consumption on these farms about 50 per cent.

Despite maximum demands of 2.3 to 7.9 kw., all these farms are served with 3-kw. transformers except the one having an 8.1 maximum demand, which has a 5-kw. transformer. The diversity between customers' demand and line demand is two or better; the ratio of connected load to maximum line demand about 10 to 1. At the rate in force the average cost per kilowatt-hour ranges from 5.3 to 8.1 cents.

In addition to the farmers named, there are connected to this line two other farms, a school and a children's home, adding 800 kw.-hr. a year. The gross energy delivered to the line was 38,780 kw.-hr. in one year, the total connected load 187.6 kw. the maximum line demand 33.6 kw. in September and the total connected transformer capacity 37 kw.

TABLE II—EFFECT OF DIFFERENT USES ON AVERAGE MONTHLY CONSUMPTION

Month, 1925-1926	All Uses	Without Water Heaters	Without Water Heaters and Large Motor	Without Water Heaters and Ranges	Without Water Heaters, Large Motor and Ranges	Without Water Heaters, Large Motor and Range and Incubators
April	236	236	234	182	180	148
May	290	290	290	230	230	194
June	276	276	276	190	190	175
July	270	270	270	171	171	170
August	343	343	253	246	156	156
Sept	293	293	247	219	173	173
Oct.	292	292	203	255	166	166
Nov.	257	225	209	200	184	184
Dec.	223	200	200	170	170	170
Jan.	241	208	208	184	184	184
Feb.	241	209	209	180	180	180
March	231	167	167	138	138	121
Average	257	250	230	222	178	170

TABLE III—EQUIPMENT ON RED WING FARMS AFFECTING ELECTRICAL CONSUMPTION AND DEMAND

No. 1 (274 acres, 165 acres leased, 50 Holsteins, 40 hogs).—Range, washing machine, sewing machine motor, 5-hp. and 1½-hp. motor, cream separator motor, bathroom equipment, dairy-room equipment, milking machine, grain elevator, fan-ventilating system.

No. 2 (130 acres, 17 Shorthorns, 37 hogs).—Range, water heater, automatic deep well pump, washing machine, cream separator motor, bathroom equipment, laundry tray.

No. 3 (720 acres, 150 Shorthorns, 60 hogs).—Combination range, 5-hp. and 3-hp. motor hay hoist, feed grinder, washing machine, automatic water pump, sewing machine motor, vacuum cleaner, electric incubator, electric brooder, laundry tray, pump jack, root cutter.

No. 4 (257 acres, 140 acres leased, 60 Herefords, 20 Holsteins, 40 hogs).—Combination range, 3-hp. motor, deep-well pump, automatic cistern pump, electric incubator, electric brooder, feed grinder, ironing machine, 5-hp. motor utility truck, vacuum cleaner, refrigerator and electric refrigerating machine, washing machine, cream separator, bathroom equipment, laundry trays, electric fireless cooker.

No. 5 (296 acres, 42 Red Polls, 50 hogs).—Range, washing machine, ½-hp. and 5-hp. motors, automatic cistern pump, deep-well pump, cream separator, refrigerator and electric refrigeration machine, bathroom equipment, laundry trays, milk warmer, speed jack, ensilage cutter, vacuum cleaner.

No. 6 (190 acres, 9 Holsteins, 6 hogs).—Electric frying pan, griddle, toaster, fireless cooker, dish washer, automatic cistern pump, ironing machine, cream separator, electric brooder, electric incubator, laundry trays, vacuum cleaner.

No. 7 (170 acres, 40 Holsteins, 30 hogs).—Range, cream separator motor, electric incubator, electric brooder, milking machine, ¾-hp. milking machine motor, electric pump jack, sewing machine motor, washing machine, combination feed mill, bathroom equipment, 5-hp. and 7½-hp. motors, refrigerator, corn husker and shredder.

No. 8 (360 acres, 80 Holsteins, 40 hogs).—Range, ½-hp. pumping motor, ¼-hp. utility motor, 2-hp. milking machine motor, vacuum cleaner, ironing machine, water heater, mechanical milker, incubator, deep-well pump, washing machine, laundry trays.

The community is also using co-operatively a 15-hp. motor, with a 15-kva. transformer and truck, which with the transmission cable are moved about from farm to farm as required for heavy work like silo filling, corn husking and shredding.

Another Utility in the Movies

ANOTHER public service company—the Consumers Power Company—has authorized the recording in motion pictures of the properties of the company and of the manifold operations carried on in utilizing these properties for service throughout the state. Included in the plans for the various scenes will be the story of hydro-electric development and how it takes the idle waters of the rivers and creates energy that is transmitted all over the state for the benefit of Michigan people. The picture will also include the story of steam power generation and production and delivery of gas. The many uses to which both electricity and gas are put by the home, stores and industries will be pictured as well as the conservation work carried on by the company—reforestation, planting of game food and fish.

These pictures will be shown to the general public and also stockholders, now numbering more than 32,000.

Combating Public Ownership Propaganda by Advertising

IN A recent speech before the Advertising Club of Seattle Captain Norwood W. Brockett, director of public relations of the Puget Sound Power & Light Company, discussed at some length what he termed the propaganda being distributed by the Public Ownership League of America and other public ownership advocates.

According to Captain Brockett, the only weapon against this movement seems to be to correct the misleading statements put out by the league and its members by getting the facts before the people through such advertising mediums as are convenient and accessible. Unfortunately the medium of free publicity has seemed to be much more open to the advocates of public ownership than to the private companies, hence it has been necessary to resort to paid advertising space to get the public utilities story before the people.

The people do not understand, says Captain Brockett, that regulation by the state of light and power companies has made both competition and public ownership not only unnecessary but unprofitable. The public utility is not permitted, as in every other line of business, to make all the money it can or to charge all it can get for its product. Both the service required and the rates permitted are fixed in each state by a commission representing the people of that state. It makes no difference whether a plant is publicly owned or privately owned; it must charge a rate for its service that will do three things: (1) Pay interest on the money invested to builder; (2) pay operating expenses; (3) set aside a reasonable sum for depreciation and the replacement of worn-out equipment. Under regulation that is all the public utility is permitted to earn, and a state or municipal plant must earn that much or resort to taxation to make up the deficit.

Advocates of public ownership seem purposely to ignore the fact that electric energy is a manufactured product and that its cost to the consumer will always be fixed, not by the amount available but by what it costs to produce it. The establishment of a municipal lighting plant invariably increases the taxes of the community in which it is located. It always requires a large addition to the accounting, legal, executive and other branches of the city government, which are supported by general taxation. In addition to this, the property itself is tax exempt and either removes property from the tax roll or takes the place of property that would otherwise pay taxes. Nor is there any compensating relief in rates, since municipally owned plants cannot and do not sell their product for any less price than that of a public utility similarly situated.

Captain Brockett cites the example of the Seattle street railway system. When that property was privately owned, it paid in direct and indirect taxes an average in excess of $600,000 a year and maintained a 5-cent fare. When the property was purchased by the city of Seattle, it immediately became tax exempt and this $600,000 of tax revenue was transferred to the shoulders of the other taxpayers, whereas the fare was raised to 8½ cents.

Sales Organization and Personnel

Compensation and Choice of Salesmen Vital to Successful New-Business Operations—Specialization Essential

By C. L. DUNN
General New-Business Manager Ohio Public Service Company, Cleveland, Ohio

IT IS well recognized throughout the industry that the electric utilities have before them a large, undeveloped field for the sale of electric energy in every branch of service—domestic, commercial and industrial. It is also known that few central-station companies have proper or adequate sales organization to get this business.

C. L. Dunn, general new-business manager of the Ohio Public Service Company, speaking at the recent convention of the East Central Division N.E.L.A., at Cedar Point, Ohio, outlined a few fundamentals of an efficient sales organization. He believes the lack of co-ordination of ideas of the various companies on organization and compensation as reflected in the minds of the executives to be to the detriment of the sales departments and that the sooner a sound commission basis and efficient organization plan is sought the quicker the departments will be elevated to the place they belong, which at least, he considers, is the equal of any other department of a company.

Continuing, Mr. Dunn says: "This cannot be accomplished if we continue to pick men from all walks of life unfamiliar with our business and send them out without training to call on our customers. This condition exists to a great extent at present and I believe cannot be permanently corrected unless we use a basis of compensation other than a straight commission on merchandise sales.

"As to organization, a department should consist of several special men to handle the sale of refrigeration, radio, rural extensions, power, old-house wiring and refixturing, also the commercial or business section. In addition there should be one territory representative for each 1,500 customers, whose duty it is to assist the special salesmen by turning over prospects and to sell and service all merchandise not handled by other members of the department.

"Now for a compensation plan that will enable us to build up a department as outlined. A straight commission on sales has never and will never attract the class of salesmen to represent the industry and maintain the high standing it deserves in the community. Therefore some other method must be used to attract and hold these men, and I know of no better way than to make them feel that they are as much a necessary part of the company as bookkeepers and engineers and allow them to share in a portion of the increased revenue derived from their efforts in addition to a commission on the sale price of the merchandise sold. This method of compensation encourages salesmen to sell merchandise that means most to the company. The revenue feature of this compensation plan will eliminate turnover in the department, which has always been a source of great expense.

"With an organization and commission basis as outlined, the expense that is chargeable to operation is certainly negligible when the additional revenue and the value of close contact with customers are considered."

Digest of Electrical Literature

Transmission, Substations and Distribution

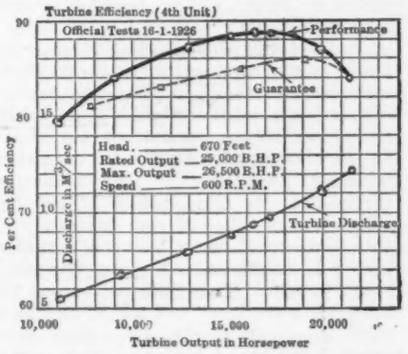
Automatic Power-Factor Regulator.—J. LABOURET.—The power factor of a connected load of induction motors can be restored to unity by installing a synchronous motor of sufficient size. But, in order to correct the phase angle at all times and at any load conditions of the group of motors, the excitation of the synchronous motor has to be changed in accordance with the varying amount of required magnetizing current. A French company has developed a relatively simple apparatus which responds to varying power factor and adjusts automatically the optimum excitation for the synchronous motor. The device consists essentially of a two-arm lever actuated at both ends by iron plungers which dip more or less in solenoids, through which flows series and shunt current of the connected motor load. Above one of the solenoids is a semi-circular row of contacts to the excitation rheostat. According to the position of the plungers, a greater or smaller number of these contacts are short-circuited by means of a flexible bronze strip attached to one of the plungers. A theoretical explanation of the device is given.—*Revue Générale de l'Electricité*, July 24, 1926.

Investigation of Transmission System Power Limits.—C. A. NICKLE and F. L. LAWTON.—In this paper the results of theoretical analysis are given, verified by miniature-system tests of the power limits of transmission systems, among the major conclusions being the following: The criterion for stability under all conditions is the steady-state power limit; the charging kva. exercises marked detrimental effects on stability; the characteristics of synchronous terminal apparatus are of great importance; improvements can be made by modifying present apparatus design; automatic voltage regulators, suitable exciters, and fast relays are essential; the mercury-arc rectifier, as an adjunct in excitation circuits, shows real advantages.—*Journal of A.I.E.E.*, September, 1926.

Overvoltages on Transformers.—A. MAUDIT.—Failures in transformer windings, characterized by punctured major insulation, have been attributed in late years to steep-front wave phenomena. A vast and prolific literature has been based upon this assumption, and Swiss and German safety rulings were augmented to provide testing methods for transformers under impulse waves. In a recent article Mr. Fallou reported on tests made on power transformers, measuring the effect of steep front waves with the aid of a cathode-ray oscillograph. The extremely short duration of these transients was clearly demonstrated by these investigations. As the puncture of solid insulation takes appreciable time and energy, it seems illogical to attribute failures of this nature summarily to impulse waves. In the opinion of the author, it is not the impulse wave which does the damage, but the relatively low-frequency oscillation following it. He compares it with a piano string, where the momentary action of the hammer causes the actually audible vibration of the string. It seems therefore that a testing method which introduces only the impulse shock is of little value. Of more importance is an investigation of the action of oscillatory waves of, say, 1,500 to 3,000 cycles upon transformer windings. Tests of this nature, recorded with an ordinary loop-wire oscillograph, are described in the second part of this paper.—*Revue Générale de l'Electricité*, Aug. 7, 1926.

Hydro-Electric Development and Steam Equipment

A 25,000-hp. Water Turbine and Alternator.—This is the story of the success attending upon the installation and operation of an English Electric Company 25,000 hp. turbine and generator which has for some considerable time been running successfully in the Sorocaba power station. This power station is situated on a river bearing the same name, 60 miles west of São Paulo, Brazil. The design of the turbine required special consideration, owing to the fact that it had to be erected on foundations already prepared for a unit of a smaller size previously installed in the station, and the necessity of getting a 25,000-hp. unit into the space available and of working with a good efficiency led to the adoption of an unusually high speed for this type of machine.—*English Electric Journal*, July, 1926.



PERFORMANCE GRAPHS OF ENGLISH UNIT

Generation, Control, Switching and Protection

Large Diesel Engines.—This special issue of the "V.D.I." is devoted exclusively to a theoretical and practical review of the present status of large Diesel motors, such as used in daily growing numbers for the drive of electric generators, and their economies. The four main articles contain data on the operating characteristics of these machines, proving their great economies as peak or emergency sets. Fuel consumption, floor space, four-cycle and two-cycle types, ignition data of various fuels and designs without compressors are among the many topics dealt with in great detail. The issue contains 37 pages with more than 70 illustrations.—*Zeitschrift des Vereines Deutscher Ingenieure*, Aug. 7, 1926.

Units, Measurements and Instruments

Recurrent Circuits: A Method of Solution.—A. G. WARREN.—The paper consists of the statement and illustration of a method of solving recurrent circuits when operating in the "steady-state" condition by reducing each element to a "rejector" resonant at the operating frequency. The initial sending-end impedance of the line and the condition for non-reflection are written down from inspection. It is shown that, for one-way working, it is not necessary or desirable that the transmitter, receiver and initial sending-end impedances should all be equal. Line distortion due to reflection is considered briefly. Although the method is applied here to filters only, it is readily extended to both continuous and loaded lines.—*Journal of Institution of Electrical Engineers (England)*, July, 1926.

Noise-Testing Method.—K. LUBOWSKY.—It is sometimes desirable to measure and to express the degree of noisiness of electric machines. Generators, motors and transformers have been accused in some cases of being too noisy. A method of determining the degree of acoustical loudness without introducing the personal element of the observer would be desirable. Such a method has been developed, and the results are fairly satisfactory. A microphone is placed on the tested machine and its receiver is shunted with ohmic resistance until it is completely silenced. The amount of shunted resistance is a measure of the noisiness of the machine. Ten tests made with such an arrangement, measuring noises due to alternating-current magnetization, are described in detail.—*A.E.G. Progress*, June, 1926.

Law of Magnetization.—S. L. GOKHALE.—The purpose of the study which constitutes the subject matter of this paper was to investigate the reliability of Frolich's law of magnetization near saturation. For the last forty years Frolich's law has been accepted as the most reliable expression representing the relation of magnetizing force to the magnetic induction produced thereby in ferromagnetic materials. The author believes that in the course of this study he has found a place where the law is not so reliable as it is generally believed to be, namely, for purposes of computation of saturation value.—*Journal of A.I.E.E.*, September, 1926.

Asymmetrical High-Current Three-Phase Load.—R. STEIN.—Considerable difficulty due to unequal reactance in the heavy copper lines is experienced in electrochemical establishments where three-phase arc or resistance furnaces receive their low-voltage and high-current supply from transformers near by.

Aside from the unbalanced load in such three-phase systems, a wattless component occurs which demands at the transformer a higher voltage than the furnace or the mere line drop would need. These conditions were carefully analyzed by the author, first on an actual 8,000-kva. furnace installation and then on a one-to-five life-size model. To obtain correct data on this model the frequency had to be chosen 25 times higher, or $25 \times 50 = 1{,}250$ cycles. The results of a great many measurements are given in vectorial representation and in tables. For an absolutely perfect balance between the phases the use of interconnected current transformers, one in each phase, is recommended.—*Siemens Zeitschrift*, July, 1926.

Calculation of Transformers for Rectifiers.—W. MÜLLER.—The current conditions imposed upon a transformer winding when feeding a mercury-arc rectifier are so different from the customary light and power load that specially designed windings only will give fully satisfactory operation. It is the purpose of this article to point out in which respects such transformers differ from the customary types. For single-phase, three-phase and six-phase transformers, wound with primary and secondary, or as auto-transformers and for various connections, such as star, zigzag and double zigzag, the current and voltage conditions are explained, and in all cases the proper placing of voltage taps for regulation is considered. For each investigated case a complete connection diagram is given.—*Elektrotechnik und Maschinenbau*, July 18 and 25, 1926.

Motors and Control

Use of Bearings in Motors.—Some of the motor requirements of the chemical industries are reviewed in this article, and mention is made of application of the ball-bearing motor to conditions of operations to be met. Freedom from maintenance troubles, decreased power loss and ability to withstand hard service are some of the advantages listed by the author of the paper as to be realized by the use of motors so equipped.—*Chemical and Metallurgical Engineering*, September, 1926.

Selection of Starters for Induction Motors.—L. F. ADAMS.—This article gives a description of the starting, accelerating, speed regulating, reversing and stopping of induction motors, together with their proper protection, and outlines the fundamental principles followed in the design and selection of motor controllers. It is pointed out that fuses cannot properly take care of overload, but a correct size of fuse will care for short circuits. With the combination of an ordinary general-purpose thermal starter giving overload protection and fuses or a circuit breaker to take care of short circuits, complete protection is secured except in a relatively small percentage of applications where the addition of phase-failure, phase-reversal and time-limit under-voltage devices may be required.—*General Electric Review*, September, 1926.

Graphical Method of Determining Size of Synchronous Condenser.—H. JOSSE.—While there are many and very accurate methods known to calculate mathematically the size of a synchronous condenser which will keep the power factor of a high-voltage transmission line at the optimum value, a new and quite exact graphical method is indicated in this paper—one which gives the desired result with a minimum of effort. At the same time the curves and charts are sufficiently flexible to solve for any one of the variables. The method is carefully explained to show how to construct the necessary curves for any particular case, and the proper use is indicated by a concrete example. The size of the required condenser is computed for a 120-kv. line, 141 km. long, the electric characteristics of which are known.—*Revue Générale de l'Electricité*, Aug. 14, 1926.

Single-Phase Motor Without Commutator.—F. PUNGA-SCHÖN.—Although the single-phase traction system has gained wide headway in Europe, the specially developed commutator motor for this service has undeniable disadvantages as compared with the three-phase or the direct-current system. A large German manufacturing concern has developed and built recently a single-phase motor of the induction type which is based upon an entirely novel principle. The machine has a multipolar, single-phase stator and a wound rotor with three slip rings. Between stator and rotor, and concentric with both of them, is placed as a third element an intermediate rotor, which is free to rotate upon the rotor shaft. It carries a direct-current excitation winding, producing as many poles as there are on the stator. Two slip rings carry the direct current into this intermediate rotor. Mechanical power is delivered only from the rotor shaft proper. Two such motors of 225 hp. each were built and tested and gave such excellent results that they were utilized for the drive of a single-phase mine locomotive. The theory of this new motor is given, together with a number of characteristic curves obtained at tests under various electrical and mechanical conditions. On thirteen oscillograms current and voltage relations in stator, rotor and secondary rotor are shown.—*Elektrotechnische Zeitschrift*, July 22 and 29, 1926.

Electrophysics, Electrochemistry and Batteries

Introduction to Ultra-Violet Metallography.—FRANCIS S. LUCAS.—This paper is a description of the ultra-violet microscope and explains in detail the technique of its applications to the study of metal structures. Much of a historical nature on the subject is given in an introduction to the article.—*Bulletin Reprint B-200, Bell Telephone Laboratories*, July, 1926.

The Cadmium Cell.—In order to measure ultra-violet light for therapeutic purposes, it is essential to choose a material sensitive mainly to light of the wave length which is responsible for the therapeutic action. Cadmium exposed behind a quartz window fulfills this condition well, as this metal is completely insensitive to visible light of a wave length greater than 350 $\mu\mu$, while the quartz window cuts off all radiation of a wave length less than 200 $\mu\mu$. The maximum sensitivity within these limits is situated approximately at 300 $\mu\mu$, which is the region of greatest biological interest. The paper goes on to describe fully the construction of the cell and give details of its operation.—*Electrician (England)*, Sept. 3, 1926.

Traction

Railway Automatic Substations.—This paper gives the details of a British firm's supervisory control gear recently installed on an Indian railway's suburban system. Among interesting specifications are the following: (1) A control board showing diagrammatically all the main electrical connections of the apparatus controlled by supervisory apparatus. (2) Installation of temperature alarms to indicate on the supervisory control board when a machine is approaching an unsafe operating temperature. The plant to be controlled comprises 20,000 kw. of rotary-converter equipment in three automatic substations; 22,000-volt alternating-current to 1,500-volt direct-current traction feeders, and railway-station lighting transformers and circuit breakers in two track section cabins. The supervisory equipment comprises five supervisory control panels, which will be installed in a central control room, and corresponding apparatus in cabinets which will be located at each of the distant substations and section cabins.—*Electrician (England)*, Sept. 3, 1926.

Telegraphy, Telephony, Radio and Signals

Rugby High-Power Radio Station.—This is an account of the new high-power radio station of the British Post Office, generally known as the Rugby station. It occupies a site of about 900 acres at Hillmorton, 4 miles south-east of Rugby, England, and works on a wave length of 18,000 m. Up to the present the maximum power has been only a little more than 300 kw., although it is capable of radiating 500 kw. on its aërial system. The article describes in detail the amount of power equipment contained in the station, its arrangement and its various sections. Up to the present the smaller portion of the aërial has been used in conjunction with an experimental transmitting installation for investigations on long-range telephony. For this reason the whole aërial has not yet been used for telegraphy, but even with the portion only in use the station has been proved to have world-wide range.—*Electrical Engineer of Australia and New Zealand*, Aug. 16, 1926.

Miscellaneous

Financing Public Utilities.—C. Y. FERRIS.—A paper read at the annual convention of Stone & Webster managers and containing a short, pertinent discussion of public utilities financing through the issuance of common and preferred stocks.—*Stone & Webster Journal*, August, 1926.

News of the Industry

Restoration in Florida

Every Effort Is Bent to Resume Full Utility Service at Earliest Possible Moment

ADVICES directly from Miami, Fla., all indicate a quick recovery from the disaster that overwhelmed that city and the neighboring territory two weeks ago. The Florida Power & Light Company, which suffered the loss of a brick and a steel smokestack at its Miami power house, none the less, as reported last week, succeeded in rendering service quickly where it was most needed, first connecting up hospitals and hotels used for first aid, and then bakeries, ice plants, laundries, etc., in their turn. The company is now making excellent progress in lighting various districts and is pushing repairs to its transmission lines at top speed.

It is expected that trolley service from Miami to Miami Beach will be restored early next week. This line was completely washed away. A set of high radio towers at Hialeah was blown over. Investigators on the spot report that scarcely a building in Miami came through without greater or less damage and two skyscrapers were wrecked. While complete restoration of utility service will evidently be a task of magnitude, it is going steadily forward.

Joint State Regulation

New England Council Goes on Record as Favoring It for Interstate Transmission Lines

BY UNANIMOUS vote at a meeting in Bretton Woods, N. H., on Friday of last week the New England Council passed resolutions in favor of joint state commission regulation of power companies which enter into agreements of interest in two or more states, declaring itself opposed to federal regulation of interstate power transmission and offering these resolutions as a statement of principles upon which the solution of many important problems may be based. This action was taken at the instance of a committee representing the power industry in the six Northeastern States acting in concert with special representatives appointed by the New England governors, each of these representatives with one exception being an officer of the public utilities commission in his state.

Conferences among these representatives developed the fact that the public utilities commissions of New England do not feel that under existing law they have adequate authority to deal with all questions arising out of the interstate transmission of power. Decisions by New England courts confirm this view, and this year Massachusetts enacted a law that in effect gives the state a measure of jurisdiction over interstate power contracts to which Massachusetts companies are party.

At the Bretton Woods meeting the power committee of the council pointed out that these questions are receiving much attention from such government leaders as Secretary Hoover, who has repeatedly expressed himself as opposed to the federal government being given jurisdiction over the interstate transmission of power, and from the chief leaders in the power and electrical manufacturing industries in the United States. The New England Council is in touch with these national leaders in relation to these matters. The resolutions passed included the following:

"Resolved, That the power committee of the New England Council is hereby authorized and instructed to continue its consultations with the representatives of the New England governors and with the representatives of the New England power companies, with a view to perfecting a proposal already under consideration which has for its purpose the establishment of a basis on which New England power companies may voluntarily accept joint jurisdiction of two or more state public utility commissions in the joint consideration of agreements involving the interstate transmission of power in the New England States."

N.E.M.A. Elects Swope to Presidency

New Association of Electrical Manufacturers Has Company Membership of 270, Representing an Annual Business of a Billion and a Half Dollars

OFFICIAL announcement of the birth of the National Electrical Manufacturers' Association, consisting of 270 leading electrical firms with a gross annual business exceeding $1,500,000,000, was made early this week. As readers of the ELECTRICAL WORLD know, the new association is the outcome of the merging of the Electric Power Club, the Associated Manufacturers of Electrical Supplies and the Electrical Manufacturers' Council.

Gerard Swope, president of the General Electric Company since 1922, was elected president of the new association at the first meeting of the board of governors. J. W. Perry, vice-president of Johns-Manville, Inc., was made treasurer. Charter members include the Allis-Chalmers Manufacturing Company, Anaconda Copper Company, Crocker-Wheeler Company, Crouse-Hinds Company, Cutler-Hammer Manufacturing Company, Electric Storage Battery Company, General Electric Company, Landers, Frary & Clark, National Carbon Company, Inc., National Metal Molding Company, Radio Corporation of America, Reliance Electric & Engineering Company, Robbins & Myers Company, Stromberg-Carlson Telephone Company, Western Electric Company and Westinghouse Electric & Manufacturing Company.

PURPOSE OF NEW BODY

The general purpose of the new association is to advance the art of manufacturing adequate and reliable electrical equipment and to standardize electrical apparatus. It will to this end co-operate with the Department of Commerce in constructive work, both in standardization and simplification. Specifically, the objects put forth in the constitution of the N.E.L.A. are to further the interests of the makers of electric apparatus and supplies in manufacturing, engineering, safety, transportation and other industrial problems; to promote the standardization of electrical apparatus and supplies; to collect and disseminate information of value to its members or to its public; to appear for its members before legislative committees, governmental bureaus and other bodies in regard to matters affecting the industry, and to promote a spirit of co-operation among its members for the improved production, proper use and increased distribution of electrical apparatus and supplies.

The association as now organized has three divisions—policies, apparatus and supply. The board has, however, indorsed the proposal to give the radio section the status of a division.

BOARD OF GOVERNORS

A board of thirty governors has been elected, as follows, the head of each division being made a vice-president of the association:

Policies Division.—C. L. Collens, Reliance Electric & Engineering Company, Cleveland, vice-president; David Sarnoff, Radio Corporation of America, New York; J. H. Trumbull, Trumbull Electric Manufacturing Company, Plainville, Conn.; Fay Woodmansee, Electrical Engineers' Equipment Company, Chicago; H. B. Crouse, Crouse-Hinds Company, Syracuse; O. H. Falk, Allis-Chalmers Manufacturing Company, Milwaukee; F. S. Hunting, Robbins & Myers Company, Springfield, Ohio; E. M. Herr, Westinghouse Electric & Manufacturing Company, New York City; Gerard Swope, General Electric Company, New York City; W. H. Thornley, Tubular Woven Fabric Company, Providence, R. I.

Apparatus Division.—J. M. Curtin, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., vice-president; Louis Allis, Louis Allis Company, Milwaukee; R. H. Goodwillie, Otis Elevator Company, Yonkers; H. W. Young, Delta-Star Electric Company, Chicago; T. E. Barnum, Cutler-Hammer Manufacturing Company, Milwaukee; H. C. Petty, Crocker-Wheeler Electric Manufacturing Company, Ampere, N. J.; A. H. Timmerman, Wagner Electric Corporation, St. Louis; C. H. Strawbridge, Goodman Manufacturing Company, Chicago; M. O. Troy, General Electric Company, Schenectady; N. A. Wolcott, Packard Electric Company, Warren, Ohio.

Supply Division.—D. H. Murphy, Wiremold Company, Hartford, Conn., vice-president; J. W. Perry, Johns-Manville, Inc., New York City; M. C. Rypinski, Brandes Products Corporation, New York City; J. P. Wright, Continental Fibre Company,

Newark, Del.; C. A. Bates, Bryant Electric Company, Bridgeport, Conn.; B. B. Dinsmore, Imperial Porcelain Works, Trenton, N. J.; J. F. Kerlin, National Carbon Company, Cleveland; D. R. G. Palmer Safety Cable Company, New York City; D. R. Bullen, General Electric Company, Schenectady; S. L. Nicholson, Westinghouse Electric & Manufacturing Company, New York City.

Aims of the New Body

President of the N.E.M.A. Indicates Spirit of the Association in Statement to "Electrical World"

AT THE invitation of the ELECTRICAL WORLD, Gerard Swope, president of the newly organized National Electrical Manufacturers' Association, has prepared the following statement indicating the spirit of the new organization and its ultimate objectives:

"The newly formed National Electrical Manufacturers' Association will have within its membership the leading organizations covering the manufacture of electrical apparatus and equipment all over the United States. The organizations that heretofore existed, the Associated Manufacturers of Electrical Supplies and the Electric Power Club, have made notable contributions and will become a basic part of this new organization. It is with a feeling of confidence and expectation that the members of these organizations have united in a single national body their fine traditions, which will be perpetuated with increased force because of the solidarity that one national organization will give.

"Co-operation with other national electrical organizations will be more effective in the new organization because of its unity. This will inevitably influence a wider use of electrical apparatus, and therefore of electricity, which in turn will be conducive to greater comforts and conveniences in the home and increased efficiencies in the workshops—the ultimate objective.

"Notwithstanding the great growth of the electrical manufacturing industry, the opportunities before it today are even greater than ever before. The watchwords—'How well can the job be done?' and 'How satisfactory is the service?'—will be emphasized by this new association. It will strive to encourage improved methods of manufacture that will reduce costs and sooner or later be reflected in lower selling prices to the public."

The following congratulatory messages, greeting the new organization, have also been received from the presidents of the other major associations of the electrical industry:

From R. F. PACK, president National Electric Light Association:

"The National Electric Light Association welcomes the National Electrical Manufacturers' Association into the family of electrical organizations. The co-operation of the several groups of manufacturers through one close-knit body is a constructive step in the evolution of organization in the electrical industry. Under the leadership of Gerard Swope, much constructive progress can be expected and the National Electric Light Association can be counted on for the fullest co-operation in carrying forward the great common purpose of developing the broad market for all the uses of electricity, for the benefit of the American people."

From GEORGE E. CULLINAN, chairman co-operative relations committee, Electrical Supply Jobbers' Association:

"The National Electrical Manufacturers' Association is a distinct step forward in the line of necessary organization within the industry to promote its advancement and development, and particularly to serve better the public at large. I am confident that in this statement I express the opinion of the membership of the Electrical Supply Jobbers' Association, and as chairman of its co-operative relations committee I believe it is a duty, as it is a pleasure, to extend all good wishes to the National Electrical Manufacturers' Association and to its first president, Gerard Swope, for the fullest attainment of every ideal and objective."

From JOSEPH A. FOWLER, president Association of Electragists International:

"The co-ordination of electrical manufacturing interests through one National Electrical Manufacturers' Association is welcomed by the Association of Electragists. All other branches of the industry have single national associations, and the consummation of such an organization of manufacturers will greatly strengthen our industry solidarity. The interests of the electragist and the manufacturer are largely identical. We welcome in the N.E.M.A. the beginning of a new policy on the part of the manufacturers to play a more prominent part in the councils of the industry. Their united effort will give a greater impetus to standardization and simplification in electrical materials, to the nationalization of the National Electrical Code and to the upbuilding of more harmonious relations between the several branches of the electrical industry, that we may go ahead with greater speed than ever before."

From C. C. CHESNEY, president American Institute of Electrical Engineers:

"The National Electrical Manufacturers' Association is assured the sincere co-operation of the American Institute of Electrical Engineers in the many problems that will come before it. The choice of Gerard Swope as the first president of the organization is a happy one, and heartfelt congratulations are extended to him."

New Canadian Government and Power Exportation

The Montreal *Gazette* is responsible for the statement that apprehension is manifest in Ottawa regarding the course the new Liberal government will take on the question of the export of electrical energy to the United States. The newspaper says: "Concern arises out of influences attending the formation of the new ministry. Friends of the Liberal party who are not being ignored in the present Cabinet making are interested in the proposed Carillon development on the Ottawa River. Application was made to the government by the Carillon interests two sessions ago for permission to export power. Although, after the storm raised by the Conservatives, no action was taken on it, it was not rejected by the then government."

There have been rumors in Canada that the Shawinigan Water & Power Company is interested, or may become interested, in the Carillon project, although no official announcement to this effect has been made.

License for Pigeon River

Federal Power Commission Will Probably Issue One—Far Western Projects Seek Approval

REPORTING to the Federal Power Commission the Chief of Engineers favors the issuance of a license to the Carolina Power & Light Company covering its project on the Big Pigeon River in Haywood County, N. C. This company owns the Pigeon River Power Company and has applied for a license in compliance with the terms of the preliminary permit granted the latter. It proposes to build a dam 150 ft. high and to install equipment sufficient to generate 60,000 hp. The primary capacity of the project is 13,500 hp. Inasmuch as this project is not involved in any of the controversies over the general development of the Tennessee River and its tributaries, it is presumed that the commission will act favorably.

The action of the commission in granting a license to the Best Flume & Power Company on Pine Creek at Pinedale, Wyo., has given rise to hope among those interested in other projects on the remote tributaries of the Colorado. Pine Creek is an upper tributary of Green River. The commission last year adopted a resolution declaring its intention to take no action on projects in the Colorado River Valley in order to give the states in the basin a further opportunity to work out an agreement. Those backing contemplated developments which have no direct bearing on the Colorado River controversy feel that they should not come within the scope of the resolution. It seems probable that the commission will consider separately any such project, and there always is the possibility that it will tire of waiting on action by the states and may withdraw its resolution.

The Sierra & San Francisco Power Company has applied to the commission for a license to cover its constructed Spring Gap project in the Stanislaus National Forest. The plant was constructed under a permit issued by the Department of Agriculture. As it now is desired to expand and reconstruct, it is necessary to take out a license under the water-power act. The dam at Big Dam is to be rebuilt and enlarged, as is the dam at the New Strawberry reservoir. The Herring Creek diversion dam and canal are to be reconstructed. The Philadelphia Ditch and penstock are to be enlarged, and the capacity of the Spring Gap power house is to be doubled. The license also is to cover a transmission line from the power house at Spring Gap to the power house on the Middle and South Forks of the Stanislaus River. After enlargement the project will have an installed capacity of 19,000 hp.

Commercial Activities in Middle West

These, with Public Relations, Furnish a Center of Discussion at the Convention of the Great Lakes N.E.L.A.—President Warns Against the Ills of Prosperity

THAT a dash of pessimism may add a tart flavor to the sweetness of prosperity was made evident when President A. C. Marshall of the Great Lakes Division, N.E.L.A., made his official address to nearly a thousand delegates at the first session of the division's sixth annual convention, held at French Lick, Ind., on Sept. 23-25. Mr. Marshall pointed to the dangers which attend prosperity, of which, he said, the greatest is the temptation to take advantage of "easy money" for the unwarranted expansion of plants and equipment and for the consolidation of properties. He impressed upon the convention the necessity for increasing earnings per dollar of investment and emphasized the duty of the commercial men in building up load densities in areas already served. The speaker took occasion to criticise the public relations activities mistakenly indulged in by some companies, referring directly to crudeness of technique and to the temptation of dwelling largely upon what is going to be done rather than letting results speak for themselves.

One theme of Mr. Marshall's address was developed later in the convention by R. F. Pack, president of the National Electric Light Association, who spoke at the banquet. In a forceful address which owed much to its conciseness and brevity Mr. Pack made some pertinent remarks on public relations. He said that words of praise for the electricity supply industry cannot convincingly come from those engaged in that industry, but must emanate from the outside. He thought the present average income from domestic consumers nothing to be proud of, but a positive disgrace. Mr. Pack deplored the present tendency toward standardization of methods for the cultivation of good public relations. He contended that public relation activities should be strictly local, depending entirely upon local conditions for the dictation of their methods.

Two Outstanding Themes

The papers presented to the convention largely reflected the two phases of electric utility operation which have increasingly occupied executive time in the past few years—commercial activities and public relations. Four out of the seventeen papers presented were wholly concerned with the first of the two subjects named, and at least five or six more considered it incidentally or in relation to other matters.

In a review of the salesman's task E. W. Lloyd, vice-president Commonwealth Edison Company, specifically mentioned a large number of appliance classifications, indicating their relative importance as loads in the system, the particular problems identified with each in regard to selling and servicing, and the necessity for the fullest co-operation with the manufacturers for the widest sales and distribution of appliances. In referring to electric refrigeration, Mr. Lloyd said frankly that the electrical refrigerator was not yet a finished product and that central-station companies entering that field should give proper consideration to the large part that servicing plays in the proper development of the business.

In a paper on advertising of merchandise, Donald M. Mackie of the Consumers Power Company emphasized the importance of taking full advantage of employees as advertising mediums. Central-station employees, distributed as they are throughout the whole community, furnish a means for that best of all possible means of advertising—by word of mouth.

A review of the work accomplished by the National Commercial Section of the N.E.L.A., together with advice on how these general plans may be applied to specific conditions, was presented by S. D. Heed. An important point brought out by him was that sale of electrical energy and appliances is in direct competition with every other agency that has designs on the household budget.

The commercial possibilities of residence lighting were the subject of an address by M. Luckiesh, president of the Illuminating Engineering Society, who declared that lighting consciousness had not yet been fully awakened either as regards the consumer's appreciation of the possibilities of lighting in the home or in the utility's recognition of the increased business it might bring.

Women Take Active Part

The women of the industry were so well represented at the convention that it was necessary to arrange for a parallel session. At this fourteen papers were presented in addition to five at the regular sessions. In the opening regular session Miss May S. Fletemeyer, chairman of the women's committee of the Great Lakes Division, presented a report of the activities of the committee during the past year. This division of the N.E.L.A. includes 3,500 women members, who held 284 meetings.

An inspirational address on women in the utility industry was delivered by Miss Elizabeth S. Lee of the Alabama Power Company. Miss Isabell Davie of headquarters spoke on the subject of making the women's committee work practical, and Mrs. Eva Hawkins Shanks of the Public Service Company of Northern Illinois made an illuminating talk on the subject of home service.

"Public Utility Financing and the Investment Banker" was the subject of an address by Chester Corey, vice-president of the Harris Trust & Savings Bank, Chicago, who said that one of the functions of the investment banker is to act as a continuing market for securities and that it is to the advantage of his reputation that securities shall maintain their value. Mr. Corey uttered a warning against overcapitalization of utility companies.

In an address on merchandising in regard to public relations, W. A. Jones, chairman of the Public Relations National Section, said that in the last analysis the companies are always merchandising electrical energy, since all other forms of merchandising are incidental to this. The continuing nature of the transaction imposes certain duties upon the supplier of electrical energy which make it necessary for him to maintain cordial relations with the customer at all times.

Holding-Company Standards

The principal purpose of holding companies was defined by Dr. Theodore Grayson of the University of Pennsylvania as control for economy and service. In his address on "Some Standards of Finance Applicable to Holding Companies," Dr. Grayson admitted that the present large increase in the number of holding companies possibly justified the suspicion that some of them were simply organized to take advantage of prosperity to make gains for which no real return was rendered.

A point brought out by Prof. G. I. Christie of the Agricultural Experimental Station of Purdue University, in an address on recent developments in rural electrification, was that much of the machinery and apparatus available had not been particularly designed for farm use and for this reason the utilization of electricity on the farm had been greatly hampered in a number of cases.

The electrical manufacturer's desire for closer standardization of demands for equipment and for a more even distribution in the placing of orders was voiced by E. H. Sniffin of the Westinghouse Electric & Manufacturing Company. Mr. Sniffin asked that power companies be not so insistent upon small changes in design in each order for a turbine or a large transformer, and that they do not all come into the market with a rush, each demanding immediate delivery of large pieces of equipment and causing the manufacturer's working forces to ebb and flow like the tides of the sea.

That prompt collections are not incompatible with the maintenance of good public relations was the contention of a paper presented by Phil H. Palmer, vice-president and general manager of the Northern Indiana Power Company. Mr. Palmer deplored the abrupt and quite often discourteous methods of collection employed by some companies, avowing that there is no necessity for them.

The "why" of personal service work was discussed in a paper by J. Paul Clayton, vice-president of the Central Illinois Service Company. It is not the object of this work, he said, to argue and to try to convince the customer that the service is good, if the customer feels otherwise. The most efficient personal service work is done when the customer is induced to talk freely without being influenced by the fact that he is talking to an employee of the utility.

Physical research methods in the study of dielectric materials, with particular reference to the composition of porcelain in line insulators, were interestingly explained in a paper by John F. Lapp of the Lapp Insulator Company.

St. Lawrence Development Plan Adopted

New York Water Power Commission Passes Resolution Setting Forth Terms and Conditions and Invites Applications for License—Single-Stage Scheme Favored

BRINGING to a climax a controversy that has dragged over a period of fifteen years as to who should develop state-owned water power—private interests or the state—the New York State Water Power Commission on Friday, Sept. 24, adopted a resolution prepared and introduced by Attorney-General Albert Ottinger setting forth the terms and conditions under which a license for the development of St. Lawrence River power will be issued and setting Friday, Oct. 15, as the date upon which the final hearing will be held, after publication of notice, prior to the issuance of a permit for development. The applicants for a lease, or one of them, had to file an acceptance of the terms set forth in the resolution adopted by the commission before Sept. 30 in order that the final hearing might take place Oct. 15. Both applicants have done this.

The commission adopted the so-called single-stage plan of development, specifying a dam to be constructed near Barnhardt Island, across the St. Lawrence River, which will develop power at that point from the entire fall of the river from Lake Ontario to the dam, the total capacity being put at 1,200,000 hp. Recognizing that the rights of the Province of Ontario are substantially identical with those of the State of New York and that co-operation of both the state and province is essential, it was provided that if a license shall be issued, the licensee must make a further study in co-operation with representatives of the Province of Ontario. If need be, a new plan may be worked out and reported back to the commission, which, if equally advantageous to New York, would be substituted in place of the plan now approved.

PROVISIONS OF LICENSE

The dams and power houses must be so constructed that there will be on the New York side of the international boundary a power house capable of controlling the flow of the river and producing at least half of the power which may be generated from the entire development. Some adjustments of the boundary line may be necessary to provide such equal division.

The more important provisions to be included in a license, if issued, are these:

The license shall be for 50 years.

Consent of any other governmental agency necessary must be secured within three years from date of license.

Within five years thereafter the plant must be ready to operate and capable of producing at least 500,000 hp., being brought up to the full capacity of 1,200,000 hp. as rapidly as business permits.

The licensee must provide transmission lines to distribute the energy in New York State.

The state is to have full power to regulate rates charged for electricity.

The licensee must protect navigation along the St. Lawrence River or along the canals adjacent to the river from any damage occasioned by the construction or operation of power project works.

At the end of 50 years the title to the entire property is to vest in the state.

The state, immediately upon the completion of the construction, may purchase the entire plant at actual cost plus 15 per cent. At any later time during the term of the license, upon five years' notice, it may purchase the plant at such cost, less the amount then in the amortization reserves, plus 15 per cent.

For the privileges conferred by the license the state shall receive, in semi-annual installments:

1. An administration charge of $75,000 per year from the date of the license.

2. A cash license charge at the rate of $2.25 per horsepower of plant output per year (based on the assumption that the Federal Power Commission's administration will not exceed 25 per cent), which payment, it is estimated, will eventually exceed $2,500,000, but which shall never be less than (a) $250,000 per annum during the first two years after the completion of construction, which must be not less than five years from the date when construction was started; (b) $500,000 per annum during the following two years; (c) $1,000,000 in any year thereafter, plus three annual payments to amortization reserves which shall be sufficient to return the cost of the property by the termination of the license.

License charges may be readjusted at the end of each five-year period. Before starting construction the licensee must execute a ten-million-dollar bond conditioned upon faithful performance and completion of the work.

In the event that both applicants for a license, the American Super-Power Corporation and the Frontier Corporation, accept the terms outlined in the resolution adopted by the commission, the commission after public hearing will be obliged to decide which is better qualified to receive the license and carry out the work.

OBJECTIONS MADE TO PLAN

The Committee on Coal and Giant Power, a national organization for which Arthur G. Hayes, a lawyer, is a prominent spokesman in New York, has come out in criticism of the Water Power Commission's plan. This committee objects to the recapture terms of original cost plus 15 per cent as in excess of the parallel provisions of the national water-power law, says that the return to the state will really be paid by the consumers in high rates, that the capital account is not held down to actual investment as in the federal law and that there are large loopholes left for the inclusion of "good will" and other "watered items," while apparently no control "is to be retained over the manner in which securities are issued nor over the bankers' commissions."

Planks on water power adopted by the Democratic and Republican party conventions this week reiterate the former respective party positions, the Democrats favoring the development of state water power by a state agency under the plan of Governor Smith and the Republicans opposing any incursion of the state into the utility business.

Hoover on Columbia and Colorado River Situation

A definite plan for financing development of the Columbia River basin is being worked out by Washington State interests, according to Secretary of Commerce Hoover, who spent more than a week in that section during his recent Western trip. The plan will include power development as well as the ultimate irrigation of about 12,000,000 acres of land. Secretary Hoover said that he believed the irrigation works in the Columbia basin could be handled with approximately $125,000,000 as a revolving fund as the land will pay its way as opened to cultivation gradually. The work would require ten years' time the Secretary said, and by the end of that period the growth in population would make it profitable to put the area into cultivation.

The Secretary also gave some attention to the Colorado River problem while in the West. This situation, he said, in so far as an agreement among the states is concerned, is in the same situation as when Congress adjourned. A meeting has been called at Los Angeles to which representatives of Arizona have been invited, and from this there may be some development, the Secretary said, although he did not appear to be especially optimistic over prospects for ratification of the compact. Congress may be willing to act without this agreement among the states, he remarked. Experiences last spring had emphasized to the people of the Imperial Valley the necessity for some action to prevent a serious flood.

A.E.R.A. Meets in Cleveland Next Week

Abandoning its usual meeting place, Atlantic City, for Cleveland, the American Electric Railway Association will hold a five-day convention in the Public Auditorium of that city on Oct. 4-8. Besides the sessions of the parent association, there will, as usual, be sessions of the Engineering, Transportation and Traffic, Accountants' and Claims associations. Under the general subject of "Power" on Thursday afternoon, Oct. 7, there will be discussions of general interest to electrical engineers. These will be based on committee reports covering power generation and conversion, power transmission and distribution and automatic substations, presented respectively by L. D. Bale of the Cleveland Railway, Charles H. Jones of the Chicago, South Shore and South Bend Railroad and Adrian Hughes, Jr., of the United Railways & Electric Company, Baltimore. There will be no sessions of the association or any of its branches on Wednesday, Oct. 6, this day having been set aside for the inspection of manufacturers' exhibits.

Purchases and Mergers

Last Electric Light and Gas Plant in Wisconsin to Vote on Sale—Many Small Plants Give Up

A PROPOSAL to sell to the Wisconsin Gas & Electric Company for $450,000 the electric light and gas plant of Fort Atkinson, Wis., has been acted on favorably by the City Council and will be submitted to popular vote next month. This is the only remaining municipal electric light and gas property in Wisconsin. Fort Atkinson has been purchasing its electrical energy for redistribution from the Wisconsin Gas & Electric Company, which forms part of the North American Company's system.

The Southern Wisconsin Electric Company has purchased that part of the former system of the Carey Electric Light & Power Company which furnished service to the towns of Slade's Corners, Twin Lakes and Bassett and summer resort and rural territory in the same district. This arrangement is in accordance with the three-cornered agreement for division of disputed territory lately noted as having been entered into by the Southern Wisconsin Electric Company, the Wisconsin Gas & Electric Company and the Public Service Company of Northern Illinois.

The projected merger, already reported, of seven southern Indiana electric light and power and two water plants as the Mid-States Utilities Company has been sanctioned by the Indiana Public Service Commission, which authorized $150,000 of preferred stock for the purchase of the Georgetown Electric Light & Power Company, the Leavenworth Electric Light Company, the Marengo Milling Company, the Pekin Light Company, the English Milling Company, the Palmyra Light & Power Company and the municipal plant at Birdseye. The water plants are at Leavenworth and Marengo.

The New York Public Service Commission last week heard the application of the Mohawk-Hudson Power Corporation for consent to acquire all or more than 10 per cent of the capital stock of the Troy Gas Company, which has an electric division. The commission also heard the application of the Fulton County Gas & Electric Company for authority to acquire the outstanding capital stock of the Fort Plain Gas & Electric Company and to absorb the company, as well as the application of the Fulton County Gas & Electric Company for authority to acquire the outstanding capital stock of the Broadalbin Electric Light & Power Company and absorb that concern. No opposition was made to any of these petitions, which are virtually certain to be granted.

The Illinois Commerce Commission has issued an order permitting the Central Illinois Public Service Company to purchase the electric utility property of the municipality of Middleton, Ill. The citizens recently voted 111 to 5 to sell their plant to the company.

The towns of Eddyville, Beaver Dam, Simpsonville, Fredonia and Clarkson have been added to those supplied with electric service by the Kentucky Utilities Company. Eddyville had a municipal plant, and Beaver Dam was previously served by a small local company.

Lynbrook, N. Y., has, by vote of the City Council, decided to turn the leased municipal power plant back to its owners, the Long Beach Power Company. The decision was made partly as the result of litigation that has been going on since 1919 and partly because of the fact that the City Council believes that the city could not hope to compete with the power company in the matter of rates.

The Branchville (S. C.) municipal electric light plant has been sold to the Edisto Public Service Company of Denmark, S. C. The Burns (Kan.) electric system has been sold to the Kansas Gas & Electric Company. The Bastrop (La.) municipal light and water plant, has been acquired by the Louisiana Power & Light Company.

Illinois Commerce Commission Again Attacked

One hundred representatives of Illinois cities are reported to have attended the second meeting of the Illinois League of Municipalities, held at Rockford, Ill., a week or so ago, at which further attacks on the Illinois Commerce Commission were made. A third meeting is to be held in East St. Louis soon after the November election. Willis J. Spaulding, Commissioner of Public Utilities at Springfield, Ill., denounced the contributions made by the executives of utility companies to the primary campaign funds of candidates for United States Senator. The terminable permit bills pending in the Illinois Legislature were also attacked by Mr. Spaulding and by Francis X. Busch, Chicago corporation counsel, who were the principal speakers.

Financiers Visit Aluminum's New Hydro Development

A group of prominent United States and Canadian financiers paid a visit on Sept. 25 and 26 to the Lake St. John and Chicoutimi districts of the Province of Quebec. The party were the guests of Arthur V. Davis, president of the Aluminum Corporation of America, and included E. W. Beatty, president of the Canadian Pacific Railway; Sir Herbert Holt, who is prominently identified with a number of big enterprises throughout Canada; Sir Joseph Flavelle, president of the Canadian Bank of Commerce; George Allen, president of the Duke-Price Company; Anson W. Burchard, vice-chairman of the General Electric board of directors; J. E. Aldred, president of the Shawinigan Water & Power Company; Julian C. Smith, president of the Quebec Power Company; William S. Lee, vice-president Southern Power Company; R. B. Mellon, president of the Mellon International Bank, Pittsburgh, and others of importance in industrial, utility, banking and legal circles.

Arvida, the site of the Aluminum company's big plant, was the main objective of the visit. Here, less than a year after the land was taken over, production, made possible by hydro-electricity, has begun. It is estimated that fully 50,000,000 lb. of aluminum will be produced this year. This production will be increased eight to ten times when the plans are completely executed, and Arvida, it is prophesied, will rapidly attain a population of twenty or thirty thousand.

Seattle Preparing the Way for Second Skagit Unit

Construction of the second unit of the Skagit River hydro-electric project by the city of Seattle was brought nearer by the Seattle Board of Public Works on Sept. 20, when that body accepted plans for a dam at Diablo Canyon and issued a call for bids for the construction of a railroad, 4¼ miles long, from Gorge Creek to the canyon, the improvement to cost, it is estimated, $3,400,000. Following the completion of this work, a power plant will be built at Diablo Canyon and bids taken for furnishing two 37,500-hp. turbines and auxiliary equipment, etc. The plant and equipment will cost $2,689,500. The total cost, including the railroad and the dam, is placed by Superintendent J. D. Ross and his engineers at $6,089,500, or a fraction in excess of $80 per horsepower. The installation of machinery at this plant will not be made for nearly a year. Superintendent Ross says the new dam at Diablo Canyon will afford 100,000 acre-feet of stabilized storage space.

Sixteen "Electro-Test" Farms Running in Wisconsin

"Electro-test" farms have so far been established in nine counties of Wisconsin in order to study the application of electricity to agriculture under widely varying conditions and types of farming. The results of tests and experiments on these farms will supplement the data obtained from the experimental line at Ripon, built two years ago. Although the work on the Ripon line will continue, the location of the test farms in widely separated parts of the state will yield data more representative of Wisconsin's diversified farming. An electro-test farm is now easily accessible to most farmers of the state, enabling them to see the application of electrical energy to agricultural practices possibly peculiar to their territory and to follow new developments.

Observations and records on energy consumption and cost data are made under the direct supervision of the company represented, and the data are co-ordinated and assembled by the state project leader in co-operation with the university and the Wisconsin Utilities Association. More farms will be added if requirements demand.

The majority of the farms selected are dairy farms, ranging from the small ten-cow farm to the farm with more than one hundred cows. Poultry, truck, hog and general farms are also represented. Some of the farms have had electric service for over five years and are well equipped with labor-saving appliances, while others represent a new development. Electro-test farms are now open to visitors near Whitewater, Wausau, De Forest, Sheboygan, Pickett, Lake Geneva, Oconomowoc, Jackson, Oneida and Two Rivers. They will be marked by illuminated signs at the farm entrance.

Personnel of Industry Wiring Conference

Appointment Announced of Delegations Representing Central Stations, Manufacturers, Jobbers and Electragists to Convene on Oct. 15 Next

ANNOUNCEMENT has just been made of the men who will compose the industry conference on wiring. This is the conference initiated jointly by the Association of Electragists International and the wiring committee of the National Electric Light Association and which is to be composed of delegations of four men each, representing the four major branches of the industry, under the chairmanship of Earl E. Whitehorne, commercial editor of the ELECTRICAL WORLD. The purpose of this conference will be to investigate the present trend of wiring, and it will convene at the Engineers' Club, New York, on Oct. 15 and 16. The membership of this conference will be as follows:

Representing the National Electric Light Association: W. H. Blood, Jr., Stone & Webster, Boston; A. P. Good, Commonwealth Edison Company, Chicago; J. D. Noyes, Detroit Edison Company; Charles J. Russell, Philadelphia Electric Company.

Representing the National Electrical Manufacturers' Association: H. R. Sargent, General Electric Company; W. D. Barker, United States Rubber Company, New York City; C. A. Bates, Bryant Electric Manufacturing Company, Bridgeport; W. E. Sprackling, Tubular Woven Fabric Company, Pawtucket, R. I.

Representing Electrical Supply Jobbers' Association: G. A. Cullinan, Graybar Electric Company; W. I. Bickford, Iron City Electric Company, Pittsburgh; W. R. Herstein, Wesco Supply Company, Memphis; O. F. Rost, Newark (N. J.) Electrical Supply Company.

Representing Association of Electragists International: J. A. Fowler, Fowler Electric Company, Memphis; A. P. Denton, Denton Engineering Company, Kansas City; W. C. Peet, Peet & Powers, New York City; G. E. Shepherd, Shepherd-Rust Electric Company, Wilkes-Barre, Pa.

A.E.I. COMMITTEE ON WIRING STANDARDS NAMED

The special committee on electragist standards for wiring specifications authorized by the 1926 convention of the Association of Electragists International has been named by President Joseph A. Fowler, and its first meeting will take place in New York City Oct. 16, immediately following the meeting of the industry-wide wiring conference. The members are A. Penn Denton, Kansas City, chairman; W. Creighton Peet, New York; Allan Coggeshall, New York; George E. Shepherd, Wilkes-Barre; A. C. Brueckmann, Baltimore, and J. H. Schumacher, Winnipeg, Manitoba. Following the organization of this special committee a large technical advisory sub-committee will be appointed, with representatives covering all parts of the country, to assist in the development of these standards.

Briefer News

More Evidence of Electrical Growth in South Texas.—The Central Power & Light Company, which serves 88 communities in south Texas, is planning to add a 7,500-kw. unit to its plant at San Benito, where a new 6,000-kw. turbo-generator has recently gone into service. The company is also rushing to completion a 3,300-kw. unit at Corpus Christi.

Los Angeles Gas & Electric's New Substation.—Construction work is proceeding rapidly on the new Lawrence Street outdoor switching station of the Los Angeles Gas & Electric Corporation, which will control the transmission lines connecting the Alameda Street power house with the East Side substation and part of the lines feeding various distribution substations. Fifteen switching positions will be built this year, the ultimate capacity of the station being twenty-eight 33,000-volt and ten 16,500-volt positions. A control house, 45 ft. x 67½ ft., to house the switchboard and a 2,400-volt substation are also being erected. A building 37 ft. x 80 ft. will house the switches and regulators for this substation, the transformers being installed outdoors.

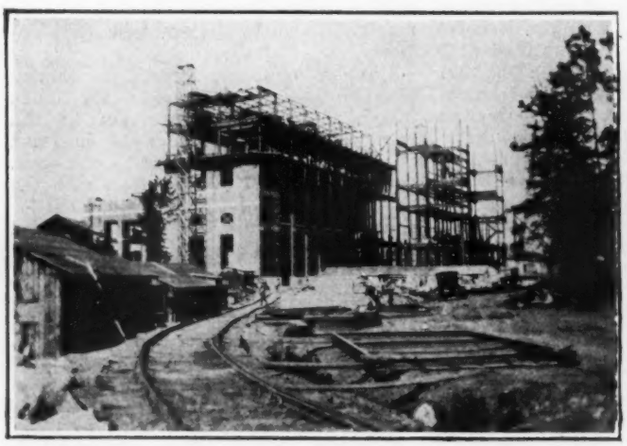
Villisca, Iowa, Still Hestitates Between Public and Private Service.—The special election in Villisca, Iowa, to decide whether to continue a contract for electric power and light service with the Iowa Service Company has been deferred pending decision of the Iowa Supreme Court on the legality of a bond issue authorized by the town for the construction of a municipal plant.

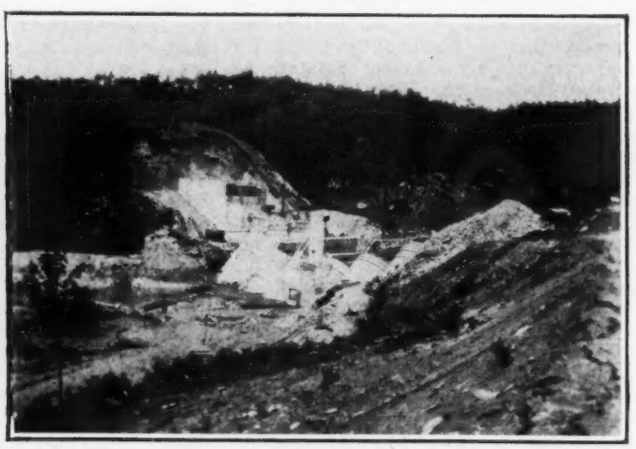
New Tennessee Company Authorized to Build 50-Mile Line from Pigeon River Dam.—The State Railroad and Public Utilities Commission of Tennessee has authorized the Public Service Company, chartered in Maine, to build and operate a 110,000-volt steel-tower transmission line from the hydro-electric plant to be built on Pigeon River, just across the North Carolina border, to Kingsport, Tenn., a distance of 50 miles. The cost of the new line is put at $500,000.

Southern California Edison to Have Unusual Penstock Installation.—Contracts have been let by the Southern California Edison Company for the penstock pipe to be used in its No. 2A power plant on the Big Creek-San Joaquin River project. This penstock will be more than a mile long and will be unique in that a single line of pipe will carry the water down a 2,400-ft. drop to the power house, where the penstock will divide and supply the two 56,000-hp. generating units.

General Gas & Electric Notes Growth of System.—Existing generating-plant facilities of the Barstow electric systems, controlled by the General Gas & Electric Company, are said in an an-

Views of Two Power Plants Which Are Now Under Construction in North Carolina





PHOTOGRAPHS taken recently of two power plants under construction in North Carolina are reproduced above. On the left is the Buck steam plant of the Southern Power Company on the Yadkin River, 9 miles from Salisbury. This plant, which will have an eventual rating of 75,000 kw., will prove an efficient provision against the recurrence of the droughts which in recent years have hampered service by this company's hydro-electric system. On the right is shown progress made on the Lake Lure plant at Chimney Rock, N. C. This hydro-electric project is being carried out in connection with the establishment of a pleasure resort. It is expected to furnish 13,500,000 kw.-hr. a year to the Blue Ridge Power Company, serving Hendersonville, N. C., Spartanburg, S. C., and other places.

nouncement by that company to have been increased by 72,500 kw. in the last few months. In this figure are included the initial 12,500 kw. at the new St. John's River plant at Benson Springs, Fla., belonging to the Florida Public Service Company; 30,000 kw., the rating of the second unit at the Broad River Power Company's steam plant at Parr Shoals, S. C., and 30,000 kw., the rating of the second turbo-generator at the Susquehanna River station of the Metropolitan Edison Company near Harrisburg, Pa. Enlargements to be made in the near furture include a 30,000-kw. unit at the Johnson City station of the Binghamton (N. Y.) Light, Heat & Power Company.

Would Develop Wind River.—Another hydro-electric plant in the heart of the Cascades in the southern part of Washington State, with an output of 10,000 continuous electrical horsepower, is outlined in an application made to the state by W. H. Hufford of Stevenson, Wash. The project would call for the use of 600 cu.ft. from the Wind River, a tributary of the Columbia. A fall of 252 ft. would be utilized. The point of diversion would be approximately 8 miles northeast of Stevenson, and the dam would be of steel-reinforced concrete, with a top measurement of 150 ft. The cost is put at $250,000.

Norfolk (Va.) Station to Be Enlarged.—A contract has been awarded by the Virginia Electric & Power Company to Stone & Webster to design and construct an extension to the Norfolk (Va.) power plant on Reeves Avenue. New equipment will include a 30,000-kw. turbo-generator, with boilers, coal-handling apparatus and other auxiliaries. The new boilers, rated at 1,700 hp. each, will be operated at 425 lb. steam pressure and 725 deg. F. temperature. Underfeed stokers will be employed, and two new brick stacks will be erected. A total expenditure of $5,000,000 is contemplated. The enlarged power supply will, Vice-president J. F. McLaughlin prophesies, take care of the growth of the industrial demand in the Norfolk-Portsmouth district for some time to come. Work will start immediately and on its completion the Norfolk plant, with about 75,000 kw. installed, will be the largest electric generating station in Virginia.

North Dakota Has Mouth-of-Mine Steam Plant on Missouri River.—The four-hundred-thousand-dollar power plant being built near Washburn, N. D., for the Otter Tail Power Company, Fergus Falls, Minn., is almost ready for service. This plant will obtain its fuel from lignite deposits, being built near a lignite coal mine on the north bank of the Missouri River, from which water will be used for cooling purposes. The Otter Tail Power Company owns and operates six hydro-electric plants, all in Minnesota on the Red River, and has steam plants at Jamestown, Devil's Lake and other North Dakota towns, as well as at Fergus Falls. Lignite is being burned at Jamestown and Devil's Lake, but it is hauled some distance. The new plant will connect with a 40,000-volt network 1,500 miles in extent and will transmit power as far as Jamestown and Devil's Lake, replacing several small steam plants recently acquired by the company.

American Electrochemical Society's Fall Meeting.—The fall meeting of the American Electrochemical Society will be held at Washington on Oct. 7, 8 and 9, with headquarters at the Hotel Washington. There will be a symposium on the second day on "Materials for Extreme Conditions in the Electrochemical Industries," at which Dr. H. W. Gillett of the Bureau of Standards will preside. Friday morning, Oct. 8, will be devoted to papers on electrodeposition, and on Friday noon a "round-table" discussion will be held under the chairmanship of Prof. E. M. Baker. The subject of the "round table" will be "Preparation for Electrodeposition." The afternoon will be devoted to trips to laboratories and industrial plants.

Initial Installation of Panhandle Power & Light's New Plant 10,000 Kw.—The plant which is being built on the Canadian River in Texas, 60 miles from Amarillo, by the Panhandle Power & Light Company, a subsidiary of the Kansas City Power & Light Company, will have an initial installation of 10,000 kw., instead of 5,000 kw., as stated in the "Briefer News" of Sept. 11.

Coming Meetings of Electrical and Allied Societies

[A complete directory of electrical associations, with their secretaries, is published in the first issue of each volume. For latest list see ELECTRICAL WORLD, July 3, page 50.]

Empire State Gas and Electric Association—Lake Placid Club, N. Y., Oct. 4 and 5. C. H. B. Chapin, Grand Central Terminal, New York.

Pennsylvania State Association of Electrical Contractors and Dealers—Elks' Club, Philadelphia, Oct. 4-6. M. G. Sellers, 1202 Locust St., Philadelphia.

American Electric Railway Association—Cleveland, Oct. 4-8. J. W. Welsh, 292 Madison Ave., New York.

American Electrochemical Society—Hotel Washington, Washington, Oct. 7-9. C. G. Fink, Columbia University, New York.

North Atlantic Section, American Society of Agricultural Engineers—State College, Pa., Oct. 11-13. R. T. Wagner, 1 River Road, Schenectady.

Kansas Section, N. E. L. A.—Manhattan, Kan., Oct. 14-16. H. Lee Jones, 401 National Reserve Bldg., Topeka, Kan.

Electrical Supply Jobbers' Association—Atlantic City, Oct. 18-22. F. Overbagh, 411 South Clinton St., Chicago.

Electric Power Club—Briarcliff Lodge, Briarcliff Manor, N. Y., Oct. 25-28. S. N. Clarkson, B. F. Keith Bldg., Cleveland.

National Safety Council—Detroit, Mich., Oct. 25-29. W. H. Cameron, 168 N. Michigan Ave., Chicago.

National Association of Railroad and Utilities Commissioners—Asheville, N. C., Nov. 9-12. J. B. Walker, 270 Madison Ave., New York.

American Engineering Council—Administrative board, Ithaca, N. Y., Nov. 11 and 12. L. W. Wallace, 26 Jackson Place, Washington, D. C.

American Institute of Electrical Engineers—Regional meeting, New York, Nov. 11-12. F. L. Hutchinson, 33 West 39th Street, New York.

National Electrical Credit Association—Philadelphia and New York City, Nov. 12. F. P. Vose, 1008 Marquette Bldg., Chicago.

American Welding Society—Buffalo, Nov. 16-19. M. M. Kelly, 29 West 39th Street, New York.

Edwin Jowett, vice-president of the Kansas City company, in charge of power plants, writes that two boilers are already partly erected at this plant and one turbine "on the job." The second turbine is scheduled for delivery Oct. 20 and one unit is expected to be in operation Nov. 10. This will be less than four months from the time it was decided to build the plant, and the company regards this as a record in power-plant construction, especially noteworthy since all material had to be trucked 40 miles.

N.E.L.A. National Section Committee Meetings.—There will be a meeting of the executive committee of the Public Relations National Section, N.E.L.A., at the Edison Building, Chicago, on Oct. 7; a meeting of the national executive committee at the same place on Oct. 8, and a meeting of the executive committee of the Engineering National Section at the Edgewater Beach Hotel, Chicago, on Oct. 14. A general meeting and dinner of the last-named section will be held at the same place on the same day. Committee meetings will be held at the Edgewater Beach Hotel as follows: Accident prevention, electrical apparatus, hydraulic power, meters and overhead systems, Oct. 13 and 14; engineering administration, inductive coordination, prime movers and underground systems, Oct. 14 and 15.

Oklahoma Gas & Electric Begins Horseshoe Lake Transmission Line.—Construction of a high-voltage transmission line from the Horseshoe Lake plant of the Oklahoma Gas & Electric Company to Chandler has been started and will be rushed to completion. This line is the first leg of what will be one of the largest electric trunk lines in the state and will eventually tie the Horseshoe Lake and Riverbank plants together in a direct route. The plants are now connected by a line running north from Oklahoma City to Enid and on to Sapulpa and Muskogee. The Chandler Electric Company, which included Chandler, Davenport, Meeker and Wellston, was purchased by the Oklahoma Gas & Electric Company last May. Prior to this time energy was sold to it on a wholesale basis.

Second Unit at Martin Dam Started.—Test runs on Unit No. 2 at Martin Dam were started by the Alabama Power Company this week. This is the second unit of the dam to go into operation, No. 3 having been started about the first of September. If the present plans are carried out, Unit No. 1 will be started about Oct. 15, and it is expected that all three units will have been completely tested and accepted by Dec. 1. At some future time a fourth unit will be installed, but work on it has not yet been begun. The two units now in operation are generating an average of 900,000 kw.-hr. per day, which is not capacity operation for them, but is sufficient to meet the company's requirements in conjunction with the other plants. At the present time the lake is at elevation 454, 36 ft. below the lake capacity of 490. The fact that the two units are being operated and the water used will keep the lake from filling to capacity until winter.

Men of the Industry

H. H. Higbie Heads Illuminating Engineering Society

H. H. Higbie, who was elected president of the Illuminating Engineering Society at the recent convention in Spring Lake, N. J., as announced in the Sept. 18 issue of the ELECTRICAL WORLD, has been professor of electrical engineering at the University of Michigan since 1913. Professor Higbie is a native of New York and a graduate of Columbia University. Following graduation he joined the teaching staff of his Alma Mater as assistant in mechanical engineering in 1904. He severed his connection at Columbia in 1905 to become instructor in mechanical and electrical engineering at the University of Michigan from 1907 to 1909, devoting his time especially to electrical engineering.

H. H. HIGBIE

In 1911, after serving for two years as assistant professor of electrical engineering at Ann Arbor, Mr. Higbie transferred his interest to the East, when he became head of the departments of electrical construction and operation and of power-plant practice at the Wentworth Institute, Boston. It was in 1913 that he again affiliated himself with the University of Michigan as professor of electrical engineering. Professor Higbie is the author of several books on engineering subjects and has contributed from time to time to the technical press. He is a member of the American Institute of Electrical Engineers and the Society for the Promotion of Engineering Education.

Raines Kessler, for many years manager of the Atlanta office of the American Engineering Company of Philadelphia, has severed his connection with that company and is now connected with the Georgia Railway & Power Company in the power sales division.

John E. Wise, who has been instructor for the past several years in electrical engineering at the University of Wisconsin and director of the standards laboratory, has been appointed electrical and illuminating engineer for the Wisconsin Industrial Commission, succeeding John E. Hoeveler, who resigned from that post last year to affiliate himself with the Pittsburgh Reflector Company.

Prof. John Stephens of the faculty of engineering, University of New Brunswick, has been appointed by the city of Fredericton, N. B., to act in conjunction with S. R. Weston, chief engineer of the New Brunswick Power Commission, in the preparation of a detailed report of the hydro distribution costs in the Fredericton district.

A. H. Grimsley Receives Promotion

A. H. Grimsley, one of the best known public utility executives of the South and active in the National Electric Light Association, has been appointed vice-president of the General Engineering & Management Corporation of New York, operating manager of the Fitkin utility companies. Mr. Grimsley will be stationed in the vicinity of Chicago and will supervise the operations of the Western United Gas & Electric Company, with headquarters at Aurora, Ill.

As vice-president and general manager of the Virginia Western Power Company at Clifton Forge Mr. Grimsley saw the trend of the power industry toward consolidation and with his associates kept constantly adding to his company's territory by purchasing smaller electric light properties along the main lines of the Chesapeake & Ohio Railroad. This effort culminated a few months ago when the Virginia Western Power Company was merged with other Virginia companies to form the Virginia Public Service Company, of which Mr. Grimsley became vice-president in charge of operations.

A. W. Higgins of the General Engineering & Management Corporation of New York will succeed Mr. Grimsley at Charlottesville in the operation of the Virginia Public Service Company. Mr. Higgins is an executive of wide experience in the electrical industry.

Carl G. Schluederberg has been appointed general manager of the George Cutter Company, South Bend, Ind., according to an announcement made by F. A. Merrick, vice-president and general manager of the Westinghouse Electric & Manufacturing Company. The George Cutter Company, which is a subsidiary of the Westinghouse company, manufactures street, industrial and commercial lighting equipment and battery chargers. As general manager of the George Cutter Company Mr. Schluederberg will be in charge of all operations, including sales, engineering and manufacturing. His appointment was made in anticipation of the departure of Warren Ripple, vice-president and treasurer of the George Cutter Company, who, on account of ill health, resigned, effective Sept. 30. Mr. Schluederberg has been assistant to the managers of both the supply and merchandising departments of the Westinghouse Electric & Manufacturing Company.

W. C. Sterne New President of Rocky Mountain Division

William C. Sterne, who was elected president of the Rocky Mountain Division of the National Electric Light Association at the recent convention in Glenwood Springs, Col., as announced in the Sept. 25 issue of the ELECTRICAL WORLD, has been affiliated with public utility enterprises in the West for a number of years. In 1905 he organized a central-station company which is now known as the Summit County (Col.) Power Company, Mr. Sterne having been president and general manager since 1922. At the present time he is also president and general manager of the Arapahoe Electric Light & Power Company, Littleton, Col.; the Arvada (Col.) Electric Company, the Fort Lupton (Col.) Light & Power Company and the Municipal Properties Investing Company, Denver, which controls these three companies.

W. C. STERNE

Before entering the public utility field Mr. Sterne had an interesting and varied industrial career. He is a native of Peru, Ind., and a graduate of Harvard University, class of 1891. Following graduation he went abroad in the interest of a fertilizer company and after returning to the United States he removed to Colorado, where he engaged in the drug and chemical manufacturing business, subsequently transferring his interests to the banking and lumber business. In addition to his activity in the affairs of the National Electric Light Association Mr. Sterne is a member of the American Institute of Electrical Engineers.

P. R. Moody has been appointed power engineer in the commercial and industrial department of Charles H. Tenney & Company, with headquarters at Boston. Mr. Moody has been in power sales work in the Tenney organization for the past four years.

Van Horn Ely, president of the American Electric Power Company, has been admitted to partnership in Laird, Bissell & Meeds, banking house of Wilmington, Del., and New York. Mr. Ely will be resident partner at the Philadelphia offices.

Walter A. Heinrich has joined the James R. Kearney Corporation, St. Louis, in the capacity of chief engineer. Mr. Heinrich was formerly connected

with the W. N. Matthews Corporation, St. Louis, as chief electrical engineer. **Hal C. Fiske**, formerly connected with the sales organization of the J. E. Sumpter Company of Minneapolis, has become assistant designing engineer of the Kearney organization, and **J. C. Friedricks**, formerly identified with the Western Engineering Company of St. Louis, has been appointed engineer. **James R. Kearney, Jr.**, has been made advertising manager and secretary.

Prof. W. L. De Baufre, head of the department of mechanical engineering at the University of Nebraska, has received a year's leave of absence in order that he may engage in research work in electric power development for the International Combustion Engineering Corporation of New York.

Chester A. Bingham, formerly of the legal department of the Alabama Power Company in Birmingham, has been made treasurer of the Southeastern Power & Light Company and is now in their New York office. Born in Talladega, Ala., Mr. Bingham was graduated from the University of Alabama and the Harvard Law School and then entered the law firm of Knox, Acker, Dixon & Bingham of Talladega, leaving them in 1915 to joint the legal staff of the Alabama Power Company.

Harold C. Gage of Minneapolis, for many years prominent in the distribution of public utility securities in the Northwest and formerly president of Harold C. Gage, Inc., has been appointed general sales manager of the investment department of the W. B. Foshay Company, in charge of all security sales offices. The Foshay company, which controls, operates and finances public utility and industrial companies, is opening new security sales offices in Boston, San Francisco, Denver and Portland, Ore., in addition to the present offices in Minneapolis, St. Paul, Chicago and New York.

H. Burgi, Jr., for the past ten years power engineer of the Cumberland County Power & Light Company, Portland, Me., has resigned as of Oct. 1 to join the organization of George F. West & Son, public utility operators, Portland. Mr. Burgi is a graduate of Columbia University. Previous to his connection with the Cumberland County company he was for a time employed by the General Electric Company and the Public Service Corporation of New Jersey. He has been active in the Power Bureau of the New England Division of the National Electric Light Association, and in his new post will be associated with management engineering activities in the water company and other utility fields.

Everett L. Olds, for the past six years commercial manager of the Twin State Gas & Electric Company, Boston, has resigned to become sales manager of the Suffolk Electrotype & Engraving Company, Cambridge, Mass. Mr. Olds was educated at Dartmouth College and entered the army in 1917 following his graduation. After extended service overseas he joined the Twin State staff and has achieved a notable record on the properties of this organization in the direction of merchandising electrical appliances at a profit. He is a past-chairman of the merchandising bureau of the Commercial Section, New England Division, N.E.L.A., and is widely known in central-station circles in the Northeast.

E. E. Hill, who has been associated with the New York Edison Company since 1904, has been appointed superintendent of the meter department of the company. Beginning as a meter tester, Mr. Hill was advanced in 1913 to be general foreman in charge of maintenance of meters in the Manhattan and Bronx districts of New York City. His next advancement was to be assistant superintendent of the meter department, which position he has held up to his present appointment as superintendent. Mr. Hill has served as chairman of the sub-committee handling the revision of the installation methods section of the American Engineering Standards Committee's code for electricity meters and as chairman or a member of numerous other technical committees of the N.E.L.A., Empire State Gas and Electric Association and other organizations. At present Mr. Hill is vice-chairman of the national meter committee, Engineering Section, N.E.L.A., and chairman of the Engineering Division, Metropolitan New York Section, N.E.L.A.

Obituary

Cicero J. Lindley, member of the Illinois Commerce Commission, died Sept. 23 at his home in Greenville, Ill., following a long illness. He was 69 years old.

Desmond FitzGerald, past-president of the American Society of Civil Engineers and a distinguished specialist in railroad and hydraulic engineering, died at his home in Brookline, Mass., Sept. 22, in his eighty-first year.

John Jay Sherwin, a resident of Idaho Springs, Col., for about 30 years, died at Denver Sept. 16. Mr. Sherwin was a pioneer in the electric light and power field in the Springs, having been in his early days president of the United Hydro-Electric Company. He was born in Vermont in 1859.

D. C. Perkins, head of the firm of Downing & Perkins, Hartford, Conn., and a director in the Electric Transportation Company of that city since its organization in 1923, died on Sept. 13. Mr. Perkins was one of the most enthusiastic users and champions of the electric truck in the New England district, and although his major concerns lay outside the electrical industry, he rendered the cause of electric vehicle transportation notable service through his association with the Hartford organization. He had used electric trucks in his own business since 1912 and was a man of wide vision in this field.

Frederic Jaques Whiting, editor of the *Stone & Webster Journal* since 1907, died at his summer home in Sudbury, Mass., Sept. 27. Mr. Whiting was formerly financial editor of the predecessor of the present Boston *American* and was highly regarded in circles devoted to specialized journalism. He was the possessor of a whimsical wit and philosophical talent which, combined with sensitive artistic taste and unusual economic knowledge, marked the pages of the *Stone & Webster Journal* with charm and individuality throughout his entire editorship. He never failed to respond when called upon for co-operative service for the benefit of the public utility industry.

James P. Whitla, a director of the Pennsylvania-Ohio Electric Company and affiliated companies and attorney for the system in Merced County, died at his home in Sharon, Pa., Sept. 7 after an illness of several months' duration. Mr. Whitla had been a resident of Sharon since 1892 and had long been identified with the railway and electric service companies of the Penn-Ohio system. He also was prominent as a banker and was identified with large manufacturing interests.

Virgil Poston, for the past eight years superintendent of operations for the New York & Queens Electric Light & Power Company, Long Island City, died at his home in Bayside, Long Island, Sept. 22. Previous to his connection with the New York & Queens utility Mr. Poston had been identified with the American Gas Company, the Waukesha Gas & Electric Company in the capacity of chief engineer and with the Milwaukee Electric Railway & Light Company from 1917 to 1918. He was a native of Bonne Terre, Mo., and a graduate of the University of Wisconsin.

Frank C. Armstead, who had been identified with the Westinghouse interests since 1888, died Sept. 7. His name will always be linked with the production of the mechanical stoker, as he was identified with its pioneering, and later with its development, during the greater part of a long career. In recent years he had been acting in an advisory capacity. After some years of mechanical and operating experience, he joined Westinghouse, Church, Kerr & Company, first as an erecting man, later becoming superintendent of construction. He went in 1903 to the Westinghouse Machine Company in complete charge of the stoker department's engineering and installation work.

Frank M. Lester, editor of the *News*, published by the Public Service Company of Northern Illinois, died Sept. 11 at his home in Chicago. Mr. Lester became affiliated with the utility industry in northern Illinois prior to the organization of the Public Service Company in 1911. For several years he served the latter organization as advertising agent under Charles A. Munroe, later being appointed advertising manager under Charles W. Bradley, vice-president in charge of public relations for the Public Service Company. The first employee publication of this company was known as the *Public Service Lumen* and was edited by Mr. Lester from 1916 to 1921. The name of the publication was then changed to the *News*, Mr. Lester continuing in the capacity of editor in addition to his duties as advertising manager. In the spring of this year, however, he was compelled, because of ill health, to relinquish the duties of this latter position, although he continued to hold title as editor of the *News*.

Commission Rulings

Change of Par Value of Stock Permitted to Effect More Sales.—The Southern California Edison Company has been authorized by the California Railroad Commission to reduce the par value of its stock from $100 to $25 and to increase the number of shares from 2,500,000 to 10,000,000. This was done on the company's representation that such a reclassification of its stock would enable it to sell more shares and also to obtain a higher price.

Depreciation Reserve Is Not Provision for Replacement.—The distinction between retiring investment and replacing property was pointed out by the Missouri Public Service Commission in cases affecting the Jackson County Light, Heat & Power Company. "In calculating the annual depreciation allowance," the commission said, "it must be borne in mind that the purpose of a depreciation reserve is to retire the investment in depreciable property at the end of its useful life. The depreciation reserve is a retiral reserve and not a replacement reserve. Consequently, any estimate of the annual depreciation requirement should be based upon the investment in depreciable property."

New Form of Street-Lighting Rate Disapproved.—Thirteen contracts submitted by the Metropolitan Edison Company to the Pennsylvania Public Service Commission for approval differed from the usual street-lighting contracts in that a form of rate was proposed unlike the rate heretofore charged by the company and that generally adopted by other electric utilities operated in Pennsylvania. The company proposed to charge an annual rate of $200 per mile of distribution line used in furnishing the service, plus a charge per lamp ranging from $11 to $50, dependent upon the candlepower of the lamp. This proposed rate increased the existing rate charged the municipalities from 30 to 50 per cent. The commission refused to sanction the new rate, saying that, entirely apart from the principle upon which it was based, the data and evidence submitted in support thereof did not satisfy it that either the line charge or the lamp charge was just and reasonable.

Rates Cannot Be Predicated on Cost of Reaching Each Customer.—Dismissing as without merit a complaint of the Happy Hollow Country Club of Omaha against the Nebraska Power Company, the Nebraska State Railway Commission says that it is impossible to make electric rates on the basis of the cost of reaching each customer, as that would be cumbersome and unworkable. A proper rate schedule spreads the charges for service between the different classes and requires consideration of time, volume and characteristics of the service as they may be reflected in the use of the plant. The charges that flow from the investment are continuous irrespective of its use, and where the service is transitory, as in country clubs, the utility may set up a different zone schedule for larger users. The general rule assumes that all the property of a utility is used in common, and hence in a city rates disregard the cost to reach a patron's premises. This does not apply where a user is ouside the city limits and where service conditions are different. The commission holds that 5 per cent for depreciation, 1½ per cent for taxes, 5 per cent for maintenance and 8 per cent return are not unreasonable, although depreciation and maintenance are higher than experience has warranted in the city. If the commission were inclined to reduce the return to 7 per cent, it would have to keep in mind that the full development of the use of the line and a full return is unlikely for years. The commission found that as the club was not discriminated against in its class it had no ground for complaint.

Recent Court Decisions

Electrocution of Man Leaving Place of Work by Short Cut Use of Which Was Not Forbidden Occurred in Course of Employment.—The Supreme Court of Utah has determined, in Utah Apex Mining Company vs. Industrial Commission of Utah, that the death from contact with an electric cable of an employee of the company who left his employer's property by a short cut which employees had not been forbidden to use, but which was used without their employers' knowledge, arose "in course of employment" and that compensation was due. (248 Pac. 490.)*

Damages Awarded in Canada for Lowering of Lake Level by Power Company.—Damages in an unstated amount have been allowed by the High Court of Ontario to John Stirrett & Sons of Port Arthur against the Kaministiquia Power Company, Fort William. The Stirrett firm brought action against the power company and the Ontario Hydro-Electric Commission for an injunction and damages because of the lowering of the water level in Big Dog Lake, Thunder Bay district. The Stirrett concern claimed a loss of $400,000 in logs which were stranded on the shores of the lake through the lowering of the level of the water at a time when the Kaministiquia Power Company was using its enlarged capacity to supply power to Fort William.

License to Build Flashboard on Government Dam Conveyed No Right to Injure Riparian Property of Others.—Little Falls Fibre Company vs. Henry Ford & Son was a suit for a permanent injunction restraining defendants from maintaining flashboards on the federal dam in the Hudson River at Troy, N. Y., and for the recovery of damages claimed by reason of their erection and maintenance. The Supreme Court of the state granted the judgment asked for, asserting that riparian owners have an absolute right to have the waters of a navigable stream at their properties continued in their natural condition, free from interference or obstruction, these rights being subservient only to the right of the public for navigation and commerce and the governmental right of eminent domain. The license granted by Congress to the defendant to install the flashboards in question, which specifically provided that the licensees should be liable for all damages to others' property, did not authorize the licensees to injure the upper riparian owners by raising the height of the water in their tailraces under the theory that the licensees were the government's agent to benefit commerce. (217 N.Y.S. 534.)

Negligence Must Be Proximate Cause of Accident to Make Damages Recoverable.—A man whose property accidentally caught fire took hold of a nearby wire fence with the intention of surmounting it and was instantly killed by electric shock, the fire having, unknown to him, spread to a pole carrying electric wires, causing the wires to fall and charging the fence with 2,300 volts. Damages were sought (Robinson vs. Rome Railway & Light Company) on the ground that the central-station company owning the wire was negligent, (1) in maintaining it 3 ft. over, across and above the premises of the victim and near a combustible building, (2) in maintaining a highly charged wire in a dangerous and uninsulated condition, and (3) in not repairing the wire after its condition became known to the defendant. The Court of Appeals of Georgia reversed a decision for the plaintiff on the ground that the alleged negligence of the defendant was not the effective and proximate cause of the death, but that such cause was the intervening act of a separate and independent agency. One judge filed a dissenting opinion, holding negligence of the company responsible. (134 S.E. 132.)

Boy Killed by Live Wire on Climbing Pole After Warning Guilty of Contributory Negligence.—Damages were sought in Trimble vs. Kansas City Power & Light Company for the death of a boy of fourteen who climbed a pole to which a telephone company had affixed cleats, crawled out on the telephone cables and then, to save himself from falling, grasped with fatal results an uninsulated power wire belonging to the defendant and strung at the top of the pole. This case has been before the courts for about six years, a judgment for $7,000 having originally been granted on the ground that the company was negligent and that the pole constituted an "attractive nuisance." It was brought out that the boy was thoroughly intelligent and that his climbing the pole was an act of bravado undertaken to impress other minors and persisted in despite warnings from his companions concerning the high-tension wire. The Supreme Court of Missouri has reversed the verdict and refused all damages, holding that the victim was guilty of contributory negligence as a matter of law. (285 S.W. 455.)

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Financial and Corporate

Utility Market Inactive

Stocks Show No Outstanding Change During Week—Commonwealth Power Advance a Feature

IN THE securities markets attention has been turned, especially in the last week, to the position of money and the possibility that the Federal Reserve Bank at New York might in the near future raise its rediscount rate. Failure of the bank authorities to change the rate at their Thursday meeting last week gave hope to those in the market that want higher prices, but the bear party still maintains that a lower rate will come soon. The general opinion is that a change in the rate may stimulate a certain amount of liquidation in stocks.

Up to date the market in utility stocks has shown no pronounced change. During the week under review it moved irregularly, having been slightly weaker in the early part of the week and stronger late in the week with the general market as signs of ease in money appeared. It is recognized that the period of seasonal gains in the rate for funds is approaching and that somewhat dearer levels may be expected. The best-informed authorities see no reason to anticipate downright tight money.

Improvement in the shares of the Commonwealth Power Corporation was one of the events of the week in the market, but in moving to new recent high levels that issue did not register any substantial advance. Southeastern Power & Light shares have advanced and become somewhat more active in the trading of late on reports of improved earnings and progress with the company's new power plant. The hurricane news seemed to have no real influence on that issue.

German Manufacturing Companies Float Large Loan

Public offering was made late last week of 25-year 6½ per cent sinking-fund gold debentures of Siemens & Halske A. G. and the Siemens-Schuckertwerke G.m.b.H., totaling $24,000,000. Of this issue $6,500,000 was withdrawn for offering in Europe. These companies form one of the largest electrical manufacturing organizations in the world, their production covering the entire electrical field. Combined sales for the fiscal year 1925 exceeded $135,000,000, more than one-third of which represented exports. To each debenture will be attached warrants for contingent additional interest, entitling the holder to receive in United States gold coin on May 1 of each year, from 1927 to 1936 inclusive, $3.33⅓ for each 1 per cent (and a proportionate sum for each fraction of 1 per cent) by which the average per cent of cash dividends (to be determined as provided in the indenture) declared upon the stocks of Siemens & Halske A. G. and Siemens-Schuckertwerke G.m.b.H. for the preceding fiscal year shall have exceeded 7 per cent, all as more fully to be stated in the indenture.

The companies will issue in the first instance allotment certificates, in bearer form, evidencing payment of 50 per cent of the allotment price of the debentures represented thereby. The remaining 50 per cent may be called in one or two installments (no call to be for less than 25 per cent) on 60 days' published notice, on or before Sept. 1, 1929, and shall, if not theretofore called, be due on said date. The debentures were priced at 99 and accrued interest, to yield (exclusive of warrants) over 6.55 per cent. These debentures are to be the joint and several obligations of Siemens & Halske A. G. and Siemens-Schuckertwerke G.m.b.H. The indenture is to provide that so long as any of these debentures is outstanding the companies will not subject their assets to any lien other than those now existing and purchase-money liens, except that the companies may pledge personal property to secure obligations incurred in the ordinary course of current business. The companies' combined funded debt, as of Sept. 30, 1925, amounted to $14,066,000. Proceeds will be used to retire bonds and increase working capital.

Cities Service Power & Light

Henry L. Doherty Subsidiary Shows 12 per Cent Increase in Net Earnings—Diversity of Properties Under Its Control

THE Cities Service Power & Light Company, a subsidiary of Cities Service Company, the big Henry L. Doherty property, controls a diversified group of public utilities operating in seventeen states and serving a population of more than 2,800,000. It is itself a public utility holding company, in other words, under the larger holding organization. The properties are widely diversified both in operation and in location and the whole investment is thus stabilized. Among the larger cities served are Toledo, Sandusky, Warren, Massillon, Elyria, Lorain, Alliance and Mansfield, Ohio; Denver, Boulder, Pueblo and Fort Collins, Col.; Kansas City, Joplin, Sedalia and St. Joseph, Mo., and Kansas City and Topeka, Kan. Incorporated in Delaware in November, 1924, the smaller company acquired from the parent entire holdings of common stocks of electric power and light companies and practically all common-stock holdings of gas distributing and street railway companies.

The earnings record of the Cities Service Power & Light during the short period since its organization foreshadows big possibilities as these properties develop. For the year ended March 31 last gross earnings were $49,881,404 and net earnings were $19,063,405, including subsidiaries. This is a 6.7 per cent increase in net over the year ended June 30, 1925, when the consolidated income account of the company and its subsidiaries showed net earnings amounting to $17,844,535. Net earnings for the company alone were 12 per cent higher than for the year ended June, 1925. Interest and bond discount of $9,107,175 were earned about two and one-half times. Depreciation allowance according to the terms of the indenture was $1,645,568. Dividends on preferred stock and the proportion of income applicable to common stocks of subsidiaries not owned by the company called for $2,623,694. Preferred dividends were thus earned about seven and eight-tenths times as against five and eight-tenths times the year before. Net earnings of $4,957,801 after deduction of preferred dividends equal $7.63 a share on common stock. During the year ended June 30, 1925, the balance for common was only $6.46 a share. Operating expenses for the year were $30,817,999, or about 62 per cent of gross earnings—a reasonable ratio for a company operating steam plants.

The consolidated income account for the year ended March 31, 1926, is shown.

Gross earnings (and other income)...	$49,881,404.97
Operating expenses, maintenance and taxes...	30,817,999.27
Net earnings...	$19,063,405.70
Interest and bond discount...	9,107,175.23
Net income before depreciation...	$9,956,230.47
Depreciation (in terms of indenture of holding company)...	1,645,568.56
Net income...	$8,310,661.91
Deduct dividends on preferred stocks and proportion of income applicable to common stocks of subsidiaries not owned by Cities Service Power & Light Company...	2,623,694.11
Net income of Cities Service Power & Light Company...	$5,686,967.80

Public Service Corporation to Split Common Stock

At a meeting of stockholders called for Oct. 19 directors of the Public Service Corporation of New Jersey will submit a plan for dividing the common stock outstanding in a ratio of three to one and for putting the new stock eventually on the equivalent of a six-dollar dividend basis instead of the present rate of $5. The directors also will recommend that authorized preferred stock be increased from $100,000,000 to $200,000,000 and the authorized amount of no-par-value common

shares be increased from 2,000,000 to 10,000,000 shares.

Under the plan the holders of the outstanding 1,192,425 shares will become the holders of 3,577,275 shares, leaving 6,422,725 shares for future issue. In addition the board will recommend that dividends on the 6 per cent cumulative preferred stock be paid monthly instead of quarterly. Under the recommendation, the authorized 6 per cent cumulative preferred stock would be increased from $25,000,000 to $125,000,000. The authorized 8 per cent cumulative preferred would remain at $25,000,000 and the authorized 7 per cent cumulative preferred at $50,000,000. There were outstanding on Sept. 25 1,192,425 shares of no-par common, 215,312 shares of 8 per cent cumulative, 288,570 shares of 7 per cent cumulative and 51,973 shares of 6 per cent cumulative preferred stock.

In commenting on the proposals approved at the directors' meeting last Tuesday, Thomas N. McCarter, president, said:

"The recommendations are in the interest of more economical financing and a wider distribution of stockholdings among the public. While it is expected that much new capital will be obtained through the sale of our 6 per cent cumulative preferred, at the same time, because of favorable results of operation, common stock of the corporation is coming into favor as an investment and through the lower selling price to result from division will undoubtedly become more attractive to investors of moderate means.

"At the proper time I shall recommend to the board that the new stock be placed upon a dividend basis of $2 a year. The proposal to pay monthly instead of quarterly dividends on the 6 per cent cumulative preferred is for the purpose of giving another attractive feature to this security, which is being sold direct to the public by employees of our operating companies."

Ohio Utility Calls Bonds.—All of the outstanding first mortgage sinking-fund 6 per cent gold bonds of the Ohio Service Company, Coshocton, have been called for redemption Nov. 1 at 103 and interest.

Commonwealth Power Gives Notice of Privilege Expiration.—The Commonwealth Power Corporation (in accordance with amendment to its certificate of organization filed July 2, 1925) will issue four shares of its common stock in lieu of one share of old common stock, as originally called for by each option, upon the payment of $100, on or prior to the expiration date Nov. 1, 1926. Common stock delivered on or before Oct. 14, 1926, upon exercise of options, will receive payment of the dividend referred to above. Option warrants expire at the close of business Nov. 1, 1926, after which date they are void and of no value.

Stock Issue Approved.—The Massachusetts Department of Public Utilities has approved the issuance of 6,050 additional shares of capital stock of the Eastern Massachusetts Electric Company (par $25) at $30 a share. The company had asked authority to issue 6,600 shares at $27.50 a share, but the commission revised the order.

Commonwealth Power Corporation Issues Earnings Report.—Earnings of the Commonwealth Power Corporation and subsidiaries for the twelve months ended Aug. 31, 1926, applicable to dividends and retirement reserve amounted to $9,868,389, or $26.86 per share on the outstanding 367,451 shares of preferred stock and $6.73 per share on the 1,140,027 shares of common stock. After provision for retirement reserve earnings amounted to $17.91 per share on the

Stock Quotations of Electric Light and Power and Manufacturing Companies

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Tuesday Sept. 28	Low 1926	High 1926
ABITIBI PWR. & PAPER, com.—no par	94	70¼	98
Adirondack Pwr. & Lt.—7% pf.	106	....	....
Adirondack Pwr. & Lt.—8% pf.	113	....	....
Ala. Pwr., pf.	107	....	....
Allis-Chalmers Mfg. pf.	k107	105	110½
Allis-Chalmers Mfg., com.	89¾	78½	94½
Aluminum Co. of Amer., com.	71¾	54½	76
Aluminum Co. of Amer. new, pf.	101	....	....
Amer & Foreign Pwr., pf. 25% pd.	m110	....	....
Amer. & Foreign Pwr., 7% pf.—no par	88	86½	98
Amer. & Foreign Pwr., com.—no par	17¾	15½	42¾
Amer. Bosch Magneto, com—no par	20¼	16	34¾
Amer. Brown, Boveri, Elec.	45¾	30½	50
Amer. Brown, Boveri, Elec., pf.	k 96½	86½	97½
Amer. Elec. pwr., pf.	m111	102	111
Amer. Gas & Elec., 6% pf.—no par.	95¼	....	....
Amer. Gas & Elec., com.—no par.	108¾	64	110½
Amer. Lt. & Trac., 6% pf.	107¼	105	115¾
Amer. Lt. & Trac., com.	214	193	263
Amer. Pwr. & Lt., 6% pf.	97¼	92	99
Amer. Pwr. & Lt., com.—no par.	m 66¾	50¼	72
Amer. Pub. Serv., 7% pf.	a 97	92	99
Amer. Pub. Serv., com.	50	45	80
Amer. Pub. Utilities, 6% pf.	86	....	....
Amer. Pub. Utilities, 7% pf.	92½	....	....
Amer. Pub. Utilities, com.	70	....	....
Amer. States Sec., A	3	....	....
Amer. States Sec. B	3	....	....
Amer. Superpwr., pf.—25	k 26	23	26½
Amer. Superpower, pf.	l 95	....	....
Amer. Superpwr., Class A—no par.	k 30¾	19½	37¾
Amer. Superpwr., Class B—no par.	31¾	21¼	39
Amer. Wtr. Wks. & Elec., 7% pf.	103¾	101½	108¼
Amer. Wtr. Wks. & Elec., com.—20.	60¼	43¾	74
Anaconda Copper	49	41½	51¾
Appalachian Pwr., 7% pf.	95	90	101
Appalachian Pwr., 1st pf., 7%	95	99	102
Appalachian Pwr., com.	78	78	83
Arizona Pwr., 7% pf.	90	....	....
Arkansas Cent. Pwr., pf., $7—no par	k104	99	107
Arkansas Lt. & Pwr., 7% pf.	102	....	....
Arkansas Lt. & Pwr., com.	100	110	115
Asheville Pwr. & Lt., 7% pf.	i107	100½	107½
Assoc. G. & E., pf.—$3.50—50	50	....	....
Assoc. Gas & Elec., pf.—$6—no par	83½	....	....
Assoc. Gas & Elec., Class A—no par	36¾	25½	38¾
BABCOCK & WILCOX, com.	115½	....	....
Binghamton Lt., Ht. & Pwr., pf.	105	105	110
Birmingham Elec. pf.—$7—no par.	104½	....	....
Blackstone Valley Gas & Elec., pf.	103	103	106
Blackstone Valley G.&E., com.—50.	k100	....	....
Blaw-Knox, com.	f 80	45	80
Brazilian Trac., Lt. & Pwr., com.	f120	....	....
Broad River Pwr., pf.	93	....	....
Brooklyn Edison, com.	160¾	133	163
Buffalo, Niagara & East. Pwr., pf.—25.	l 24½	....	....
Buffalo, Niagara & Eastern Pwr., com.—no par	l 30½	....	....
CALIFORNIA ELEC. GENERATING, pf.	92	89	95
California Ry. & Pwr., pf.	k105	88	115
Carolina Pwr. & Lt., pf.—$7—no par	106½	....	....
Cent. & S. W. Ut. 7% pf.—no par	a 92½	89½	96½
Cent. & S. W. Ut., pr. In. pf.—no par	a 99	93	100
Central Ariz. Lt. & Pwr., pf.	104	....	....
Central Ark. Ry. & Lt., 7% pf.	100	....	....
Central Ill. Pub. Serv., 6% pf.	90½	87	91
Central Ind. Pwr., 7% pf.	87	85	93½
Central Pwr. & Lt., pf.	98½	....	....
Central States Elec., 7% pf.	92	....	....
Central States Elec., com.	m200	200	230
Century Elec., com.	m115	110	116
Chicago Fuse Mfg., com., no par.	a 30	30	35
Cincinnati Gas & Elec., com.	g 90	88	95
Cities Service, 6% pf.	l 89	86¼	89½
Cities Service, pf. B—10.	i 7¼	7¼	7¾
Cities Service, pf. BB—100.	l 77	74	79
Cities Service, com.—20.	l 44¾	37¼	44¾
Cities Service, Bks. Shrs.—10.	l 22¾	19½	22¾
Clarion River Pwr., pf.	95	95½	96
Cleveland Elec. Illg., 6% pf.	107	....	....
Cleveland Elec., Illg., com.	295	....	....
Colorado Pwr., 7% pf.	k 95	96	97
Columbia Gas & Elec., 7% pf.	115½	111½	115¾
Columbia Gas & E., com.—no par.	82¼	63½	90
Columbia Ry., Gas & Elec., 6% pf.	90	65	96
Columbus Elec. & Pwr., 2d pf.	104	....	....
Columbus Elec. & Pwr. com.	272	....	....
Columbus Ry., Pwr. & Lt., 1st pf.	98½	....	....
Columbus Ry., Pwr. & Lt., pf. B.	74	....	....
Col. Ry., Pwr. & Lt., com.—no par.	67	....	....
Commonwealth Edison, com.	k139	134	144½
Commonwealth Pwr., 6% pf.	89½	82	90
Commonwealth Pwr., com—no par.	42½	28½	43¼
Conn. Lt. & Pwr., 8% pf.	117	....	....
Conn. Lt. & Pwr., 7% pf.	108	....	....
Cons. Gas of N. Y., pf.—50.	58½	....	....
Cons. Gas of N.Y., com.—no par	111	87	115½
Cons. Gas Elec. Lt. & Pwr. of Balti., 6% pf.	k104	102	105
Cons. Gas, Elec. Lt. & Pwr. of Balti. 6½% pf.	e109½	108½	111½
Cons. Gas, Elec. Lt. & Pwr. of Balti. 7% pf.	e112	109	113¾
Cons. Gas, Elec. Lt. & Pwr. of Balti. 8% pf.	e126½	124	128¾
Cons. Gas, Elec. Lt. & Pwr. of Balti. com.—no par.	e 52¾	45	57½
Cons. Pwr. & Lt., 7% pf.	104½	....	....
Consumers Pwr., 6% pf.	98	....	....
Consumers Pwr., 6.6% pf.	103½	....	....
Continental Gas & Elec., 7% pfc. pf	101	....	....
Continental Gas & Elec., 7% pr. pf.	97½	....	....
Continental G.&E., com.—no par.	140	....	....
Crocker Wheeler, com.	20	....	....
Crocker Wheeler, pf.	57	....	....
DALLAS PWR. & LT., 7% pf.	106½	....	....
Dayton Pwr. & Lt., 6% pf.	99½	....	....
Detroit Edison, com.	137½	123½	141½
Dubilier Condenser & Radio, com.—no par.	5	4½	11
Dubuque Elec., 6% pf.	94	93	98½
Duquesne Lt., 7% pf.	115½	111½	116½
EAST. N. Y. UTIL. pf.	103	80	104
Eastern New York Util., com.	65	70	75
Eastern States Power.	14	....	....
Eastern States Power, pf.	89	....	....
Eastern Tex. Elec., 7% pf.	104½	....	....
East. Tex. Elec., com.—no par.	75	70	80
Edison Elec. Illum. of Boston, com.	d226	207	250
E. Paso Elec., com.—no par.	70	70	94
E. Paso Elec. pf.	103	....	....
Elec. Bond & Share, 6% pf.	l108	103½	109½
E. Bd. & Share Sec., com.—no par.	l 69½	56½	86
El. Household Util.	a 14¾	13	25
Elec. Investors, 6% pf.—no par.	92½	....	....
Elec. Investors, com.—no par.	42½	30¾	74½
Elec. Investors, 10% pd. receipts.	20	12	56
Elec. Pwr. & Lt., ctfs. pf.	65	89½	98½
Elec. Pwr. & Lt., ctfs., 40% pd.	k102½	99½	115
Elec. Pwr. & Lt., ctfs. full pd.	k103	103	115
Elec. Pwr. & Lt., ctfs., com—no par.	18¼	15¾	34½
Elec. Refrig.	k 62½	59¾	78½
Elec. Ry. Securities, com.—no par.	62	59½	10
Elec. Storage Battery, com.—no par.	89½	71¼	94½
Elmira Wtr., Lt. & R. R., 7% pf.	99	97½	99½
Emerson Elec., pf.	m101	100	104½
Empire Dist. Elec., 6% pf.	l 88	82	88
Empire Power, A.	27¾	21	32
Engr. Pub. Serv., pf.—no par.	94½	94	96¾
Engr. Pub. Serv., com.—no par.	m 21¼	21½	24½
Eureka Vac. Cleaner, com.—no par.	53¼	43	56
FAIRBANKS MORSE, pf.	k108	108½	115
Fairbanks Morse, com.—no par.	k 46¼	46	59¾
Federal Lt. & Trac., com.	34¼	28	39¾
Federal Light & Traction, pf.	91¾	86	91¾
Federal Utilities, pf.	m 70	....	....
Federal Utilities, com.	m 17	....	....
Ft. Worth Pwr. & Lt., 7% pf.	l107½	105	108½
GALVESTON-HOUSTON ELEC., 6% pf.	55	....	....
Galveston-Hstn. El., com.	22	....	....
Gen. Elec., com.	88¾	79	95¼
Gen. Elec., special—10.	11¼	11	11¾
Gen. G.&E., (Del.) com. A no par.	48¾	34	59
Gen. G.&E., (Del.) com. B no par.	m 45¼	45	48¼
Gen. G.&E., (Del.) A pf. $8 no par.	k110	105½	113
Gen. G.&E., (Del.) A pf. $7 no par.	98	95	99½
Gen. G.&E., (Del.) pf. B.	k 93½	92½	96
General Public Service, pf.	m104	90	106½
General Public Service, com.	m 12	12	16¾
Ga. Lt., Pwr., & Rys., 6% pf.	95	82	98
Ga. Lt., Pwr. & Rys., com.	m 70	65	80
Ga. Ry. & Power, 8% pf.	k114	112	114
Ga. Ry. & Power, 7% pf.	104	....	....
Ga. Ry. & Pwr., 4% pf.	k120	105	145
Ga. Ry. & Pwr., com.	120	....	....
Gt. Western Pwr., 7% pf.	h100	....	....
IDAHO PWR., 7% pf.	104	104	104½
Ill. No. Utilities, 6% pf.	a 91	90	92
Ill. Pwr. & Lt., 7% pf.	98½	....	....
Ingersoll Rand	k 98	80½	104
Int. Combus. Engr., com.—no par	43¾	33½	64½
Int. Utilities, class A—no par.	k 30	25	39
Int. Utilities, class B—no par.	5½	3½	9¼
Interstate Pwr., pf., no par.	92	....	....
Interstate Pub. Serv., 7% pf.	96½	96½	99
Iowa Ry. & Lt., 7% pf.	95	98	100
JERSEY CENTRAL PWR. & LT., 7% pf.	96	....	....
Jersey Central Pwr. & Lt., ptc., pf.	96½	96½	97
Jersey Central Pwr. & Lt., com.—no par	45	45	50
Johns-Manville, com.—no par.	148	130	165

Stock Exchange: aChicago; bSt. Louis; cPhiladelphia; dBoston; eBaltimore; fMontreal; gCincinnati; hSan Francisco; iPittsburgh; jWashington. kBid, low, high. Saturday, Sept. 25. lBid, low, high, Wednesday, Sept. 29. mLatest quotations available.

Stock Quotations of Electric Light and Power and Manufacturing Companies (Continued)

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Tuesday Sept. 28	Low 1926	High 1926
KANSAS CITY PWR. & LT., pf.	k112	107¼	107¼
Kansas Gas & Elec., 7% pf. ex. div.	l102½	99	103
Kentucky Hydro-Elec., pf.	a 93½	91½	95½
Kentucky Sec., 6% pf.	80	..	....
Kentucky Sec., com.	100	....	....
Kentucky Utilities, 6% pf.	93	90	95
Keystone Pwr. & Lt. 7% pf.	96½	95	97
LACLEDE GAS LT., pf.	b 86½	84½	90½
Lehigh Pwr. Sec., com.—no par.	16½	10	22
Long Island Ltg., 7% pf.	107½	....	....
Long Island Ltg., com.—no par.	120	120	150
Los Angeles Gas & Elec., 6% pf.	98½	....	....
Louisville Gas & Elec., Class. A	23½	22½	26½
MANHATTAN ELEC. SUPPLY.	76½	56	87½
Manila Elec., com.—no par.	45	27½	45½
Maytag Mfg., com.	22½	19	24½
Memphis Pwr. & Lt., pf., $7, no par	108	103	109
Metro. Edison, pf.—$6—no par.	92½	....	....
Metropolitan Edison, pf., $7, no par.	102	....	....
Metropolitan Edison, com., no par.	45	45	50
Middle West Utilities, 7% pf.	a107½	97½	111½
Middle West Utilities, 7% pr. lien p.	a115½	106½	123½
Middle West Utilities, com.—no par.	a117½	108	134½
Midland Utilities, pr. ln. pf.	a100	98	104
Midland Utilities pf. A	a 97	96	99½
Milwaukee Elec. Ry. & Lt., 7% pf.	a 98	100	102
Milwaukee Elec. Ry. & Lt., 6% pf.	91	87	88½
Minn. Pwr. & Lt., 7% pf.	l104½	100	104
Miss. Pwr. & Lt., pf.	103	....	....
Miss. River Pwr., 6% pf.	95	....	....
Miss. River Pwr., com.	60	....	....
Mohawk Hudson Pwr., 1st pf.—$7—no par.	102½	100	105
Mohawk Hudson Pwr., 2nd pf.—$7—no par.	101	....	....
Mohawk Hudson Pwr., com.—no par	23½	20½	28½
Montana Pwr., pf.	m117½	112½	119½
Montana Pwr., com.	78½	69½	83½
Montreal Pwr., com.	f 72½	....	....
Mountain States Pwr. pf.	97	....	....
Mountain States Pwr., com.	18	....	....
NASSAU & SUFFLOK, LTG., pf.	99½	....	....
National Carbon, pf.	m125	125	128
National Electric Pwr-A.	a 23½	19½	26½
National Elec. Pwr., pf.	a 94	92	96½
Nat. Lt., Ht. & Pwr., com.	24	22	25
National Lt., Ht. & Pwr., 5% pf.	72	71	73
National Pwr. & Lt., pf., $7—no par.	102	....	....
National Pwr. & Lt., com.—no par.	21½	16½	38½
National Pub. Serv., 7% pf.	91	....	....
National Pub. Serv., pfc. pf.	110	....	....
National Pub. Serv., A com.—no par.	20	15½	24
National Pub. Serv., B com.—no par.	k 16½	10	16½
Nebraska Pwr., 7% pf.	l107½	103	107½
Nevada-Calif. Elec., com.	m 25½	18½	44½
New Brunswick Pwr., pf.	55	30	55
New England Pub. Serv., pr. ln. pf.	93	98	99½
New England Pub. Serv., pf.	93	95½	97
N. J. Pwr. & Lt., 7% pf.	105	104	110
New Orleans Pub. Serv., 7% pf.	104	....	....
N. Y. & Queens Elec. Lt. & Pwr., 5% pf.	89½	....	....
N. Y. Central Elec., 7% pf.	98	98	100
Newport News & Hampton Ry., Gas & Elec., com.	109	98	112
Newport News & Hampton Ry., Gas & Elec., pf.	109	98	114
Niagara Falls Pwr., 7% pf.—25.	k 28½	27½	28½
Niagara, Lock. & Ont. Pwr., 7% pf.	109	110	111½
No. Amer., 6% pf.—50.	50½	49	52½
No. Amer., com.—10.	53½	42	67
No. Amer. Edison pf.—no par.	96½	91½	96½
No. Amer. Lt. & Pwr., pf.	m101	88	104
No. American Utilities, pf., full pd.	m 94½	89	96
No. American Utilities, pf., 25% pd.	m 19	18	27
N.C. Pub. Serv., pf.—$7—no par.	93	....	....
Northeastern Pwr., com.	18½	17½	36½
No. Indiana Gas & Elec., pf. A.	102	98	103
No. Indiana Public Service — pf.	101	99	103
No. N. Y. Utilities, 7% pf.	104	....	....
No. Ohio Pwr., com.—no par.	13½	11	26½
No. Ohio Trac. & Lt., 6% pf.	78	78	81
No. Ohio Trac. & Lt., 7% pf.	94	88	96
No. Ont. Lt. & Pwr., pf.	83	....	....
No. Ont. Lt. & Pwr., com.	k 73	45	75
No. States Pwr., 7% pf.	102	....	....
No. States Pwr. com.	107	....	....
No. Texas Elec., 6% pf.	55	....	....
No Texas Elec., com.	20	....	....
OHIO BRASS, com. B—no par.	76	70	79
Ohio Brass, pf.	100	98	101
Ohio Gas & Elec., 7% pf.	94	92	95
Ohio Pwr., 6% pf.	95	95½	96
Ohio Pub. Serv., 6% pf.	l 94½	95½	96
Ohio Pub. Serv., 7% pf.	l 99	96	100
Ohio River Edison, pf.	101	....	....
Oklahoma Gas & Elec., pf.	96	....	....
PACIFIC GAS & ELEC., 6% pf.	103	....	....
Pacific Gas & Elec. com.	k133	118	133½
Pacific Pwr. & Lt., 7% pf.	l103	98	102½
Parr Shoals Pwr., 7% pf.	92	....	....
Penn Central Lt & Pwr., pf.—no par	c 71	70½	91
Penn-Ohio Edison, 7% pf.	95	....	....
Penn-Ohio Elec., 7% pf.	95	93	96
Penn-Ohio Pwr. & Lt., 7% pf.	97½	94	97
Penn-Ohio Pwr. & Lt., 8% pf.	109	109½	110
Penn Pwr. & Lt.—$7—no par.	l108½	103	108½
Penn Pub. Serv., 7% pf.	103	96	103
Penn Pub. Serv., 6% pf.	87	85	90
Penn Wtr. & Pwr., com.	e167	141	171
Phila. Co., 6% pf.—50.	50	48½	50½
Phila. Co., com.—50.	74½	59½	76½
Phila. Elec., com.—25.	c 50½	41½	67½
Pittsburgh Utilities, pf.—10.	m 19½	14½	20½
Portland Elec. Pwr., 7% pf.	99½	....	....
Portland Elec. Pwr., 6% pf.	84	....	....
Portland Elec. Pwr., 6% 2nd pf.	71	....	....
Portland Elec. Pwr., com.	30	....	....
Potomac Elec. Pwr., pf.	l107½	....	....
Pwr. Corp. of N.Y., com—no par.	m 79	77½	90½
Pwr. Sec., pf.—no par.	k 23	10	29
Pwr. Sec. com.—no par.	k 6	4	13
Pub. Serv. of N. J., 7% pf.	107½	103½	109½
Pub. Serv. of N. J., 8% pf.	k121½	115	123½
Pub. Serv. of N. J., com.—no par.	97	72	97½
Pub. Serv. of No. Ill., 6% pf.	k103	100½	106
Public Serv. of No. Ill., 7% pf.	a114½	112	116½
Pub. Serv. of No. Ill., com.—no par	a132	128½	140
Pub. Serv. of No. Ill., com.	a132	129½	143
Pub. Serv. of Okla., 7% pf.	98	92	b 97
Pub. Serv. Elec. Gas, 6% pf.	k103	97	104
Public Service Elec. Pwr., pf.	k112½	106	114
Puget Sound Pwr. & Lt., 7% pf.	102	....	....
Puget Sound Pwr. & Lt., 6% pf.	83	....	....
Puget Sound Pwr., & Lt., com.	28	26½	66½
RADIO CORP. OF AM., pf.—50.	48½	44½	48½
Radio Corp. of Amer., com.—no par.	52½	32	52½
Republic Ry. & Lt., pf.	107	....	....
Republic Ry. & Lt., com.	85	....	....
Rochester Gas & Elec., 5% pf.	k 95	80	98
Rochester Gas & Elec., 6% pf.	k102½	100	103
Rochester Gas & Elec., 7% pf.	104	105	107
SAN JOAQUIN LT. & PWR., 7% pf.	97	97½	98½
Safety Cable, com.	53½	42½	55
St. Joseph Ry., Lt., Ht. & Pwr., pf.	67	60	70
Servel Corp.	17½	14½	22½
Sierra Pacific Elec., com.	27	....	....
Sioux City Gas & Elec., 7% pf.	k 98½	96	101
S. E. Pwr. & Lt., pf.—$7—no par.	l 99	....	....
Southeastern Pwr. & Lt., ptc. pf.	l 68½	....	....
S. E. Pwr. & Lt., com.—no par.	29½	20	46½
So. Calif. Edison, 8% pf.—25.	33	32½	33½
So. Calif. Edison, 7% pf.—25.	27½	....	....
So. Calif. Edison, 6% pf.—25.	24½	....	....
So. Calif. Edison, com.	k 31½	30½	32
Southern Cities Utilities, 7% pf.	85	....	....
Southern Cities Utilities, com.	33	....	....
Southwestern Lt. & Pwr., A.	60	....	....
Southwestern Lt. & Pwr., B.	60	....	....
Southwestern Lt. & Pwr., $6 pf.	83	....	....
Southwestern Pwr. & Lt., 7% pf.	k104	100	105
Springfield (Mo.) Ry & Lt., 7% pf.	97	95	100
Standard Gas & Elec., 8% pf.	56½	53½	57½
Standard Gas & Elec., 7% pf.	103	....	....
Standard Gas & Elec., com.—no par.	57½	51	69
Standard Pwr. & Lt., 7% pf.	95	....	....
Staten Island Edison, pf.—$6—no par	95½	....	....
Superheater, com.—no par.	160	....	....
Syracuse Lighting, 7% pf.	102	105	107
Syracuse Lighting, 8% pf.	115	....	....
Syracuse Lighting, com	340	260	355
TAMPA ELEC., com.	49½	48	67
Tenn. Elec. Pwr., 6% pf.	90	....	....
Tenn. Elec. Pwr., 7% pf.	102	....	....
Terre Haute, Ind. & East Trac., pf.	20	20	37
Terre Haute, Ind. & East. Trac., com	1	1	7
Tex. Pwr. & Lt., 7% pf.	l107½	102	107½
Tide Water Pwr., 8% pf.	103½	....	....
Timken Roller Bearing, com—no par	63½	44½	64½
Toledo Edison, 8% pf.	l112	111	113
Toledo Edison, 7% pf.	l102½	101	103
Toledo Edison, com.	100	....	....
Tri-City Ry. & Lt., 6% pf.	87	87½	89
UNITED GAS & ELEC., 6% pf.	98	....	....
United Gas & Elec., com.—no par.	m 57	56	66
United Gas & Elec. (N.J.), 5% pf.	71	....	....
United Gas Impr.—50.	c112	84½	144½
United Lt. & Pwr. pf.—$4—no par.	50	44	51
United L. & P. pf.—$6.50—no par.	86	81	91
United Lt. & Pwr., com., A—no par	a 14	13½	26
United Lt. & Pwr. com., B—no par	a 19	15	31
Utah Pwr. & Lt., 7% pf.	l102½	99	103½
Utica Gas & Elec., 7% pf.	k104½	103	106
Utica Gas & Elec., com.	200	....	....
Utilities Pwr., & Lt., 7% pf.	91	....	....
Utilities Pwr. & Lt., com A	31	28½	37
Utilities Pwr. & Lt., com. B—no par	k 13½	13½	18
VERMONT HYDRO - ELEC., 7% pf.	95	94	96
Virginia Elec. & Pwr., 7% pf.	104	104	105
Virginia Pwr., 7% pf.	k108	102	104
Virginian Pwr., com.	k 70	65	75
WAGNER ELEC., pf.	b 68	61½	85
Wagner Elec., com.—no par.	b 18½	13½	34½
Washington Ry. & Elec., com.	l185	....	....
Washington Ry. & Elec., pf.	l 89½	....	....
Washington Wtr. Pwr., com.	134	130	136
West Mo. Pwr., 7% pf.	92	....	....
West Penn., 7% pf.	m115	108	115
West Penn, com.	m125	118	130
West Penn Elec., pf.	k100	95½	100½
West Penn Elec., Class A.	98	88½	98
West Penn Pwr., pf.	k113	108	115
West Va. Lt., Ht. & Pwr., 7% pf.	94½	95	98
West Va. Uti ities, 7% pf.—50.	46	43	48
Western Pwr., 7% pf.	98½	91½	99
Western States Gas & Elec., 7% pf.	92½	....	....
Western States Cas & Elec., com.	16	....	....
Westinghouse El. & Mfg., com—50.	72½	65	79½
Weston Elec. Instrument, Class A.	32	27½	32½
Weston Elec. Instrument, com.	18½	13½	19½
Wheeling Elec., pf.	93	91	97
Wis. Pwr., Lt. & Ht., 7% pf	k 90	85	90
Worthington Pump, pf. A	66	66	80
Worthington Pump, pf. B	k 53	53	65
Worthington Pump, com.	32½	20½	44½
YADKIN RIVER PWR., 7% pf.	l107	102	107½
Yale & Towne, com.—25.	k 68½	60½	72½

Stock Exchange: aChicago; bSt. Louis; cPhiladelphia; dBoston; eBaltimore; fMontreal; gCincinnati; hSan Francisco; iPittsburgh; jWashington. kBid, low, high, Saturday, Sept. 25. lBid, low, high, Wednesday, Sept. 29. mLatest quotations available.

preferred and $3.84 per share on the common as compared with $12.05 and $1.97 respectively for the same period last year.

Montreal Utility Offers Stock to Customers.—The Montreal Light, Heat & Power Consolidated has offered preferred stock to its customers at $50 per share. The subscription opened Sept. 1 and closed Sept. 15. Each customer may subscribe for from one to twenty shares. Payment may be made at the rate of $2 per share per month.

Nebraska Power's New Issues.—The Nebraska Power Company has secured such a high standing in the customer-ownership market with its 7 per cent preferred stock that it is about to test that market with an issue of a million of 6 per cent preferred. Its 7 per cent is now selling at around 105. In the application for authority just filed with the Nebraska State Railway Commission permission is also asked to issue 10,000 additional shares of the 7 per cent stock, with a limitation on both issues of not less than 92. The company has also asked authority to issue $1,000,000 new 5 per cent 30-year bonds in addition to the $10,550,000 previously issued under a trust deed to the Guaranty Trust Company of New York. In the hearing on these applications the company made a showing that since the original issue of $5,600,000 bonds it has added nearly $8,000,000 worth of property, and under the 80 per cent clause there remains authority under the trust deed to issue $1,200,000. The company serves Omaha and vicinity and has been seeking to meet demands for electrification of small suburban residence groups. Its 1926 and 1927 budget calls for more than a million in added investment, and the stock issue is to finance the improvements. Nebraska Power is an Electric Bond & Share subsidiary.

Great Western Income Gains.—Net income of the Great Western Power Company of California for the twelve months ended Aug. 31 amounted to $2,229,619, after deduction of all operating expenses, interest and renewal and replacement reserves. This figure was nearly 40 per cent more than that recorded for the twelve months ended Aug. 31, 1925. Gross earnings during the period increased from $7,847,302 to $8,357,338 and operating expenses decreased from $2,865,017 to $2,847,881.

Conversion Privilege of American Water Works Stockholders.—The American Water Works & Electric Company, Inc., has sent a letter to its stockholders calling their attention to the fact that bearer scrip certificates for fractional shares of common stock dated Sept. 30, 1925, and also bearer scrip certificates representing half shares of common stock issued in connection with the plan to consolidate its electric subsidiaries,

are convertible into shares of common stock of the company only up to and including Sept. 30, 1926. On Oct. 1, or as soon thereafter as practicable, the company will sell for cash on the New York Stock Exchange the number of shares of its common stock represented by the total amount of such scrip certificates outstanding on Oct. 1.

Company Reports

The following statements of earnings have been issued by electric light and power companies for August:

Name of Company	Gross Earnings for August 1926	1925
Alabama Power	$1,050,848	$1,082,929
American Power & Light	*4,679,353	*3,957,340
Bangor Hydro-Electric	138,445	131,329
Binghamton Lt., Ht. & Pwr.	152, 801	134,576
Brazilian Trac., Lt. & Pwr.	3,476,995	2,806,346
Broad River Power	165,443	106,220
Central Illinois Light	318,355	285,495
Central Maine Power System	429,558	390,281
Columbia Gas & Electric	2,492,276	2,477,201
Commonwealth Power	3,838,161	3,355,779
Consumers Power	1,875,233	1,575,055
Detroit Edison	†3,363,497	†2,869,417
Electric Power & Light	3,993,924	3,681,340
Florida Public Service	126,082	83,322
Fort Worth Power & Light	*219,795	*218,225
Illinois Power	187,505	174,331
Kansas City Power & Light	798,832	750,895
Metropolitan Edison	764,987	706,971
Nebraska Power	*338,809	*310,046
New Jersey Power & Light	201,088	113,796
North Carolina Public Service	169,597	144,053
Northern Ohio Power	956,456	927,178
Northern Pennsylvania Power	55,300	50,132
Ohio Edison	131,313	107,992
Pacific Power & Light	*298,828	*286,383
Penn-Ohio System	1,023,623	864,317
Philadelphia Company	4,364,851	4,350,75
Portand Electric Power	923,866	859,162
Southern California Edison	2,529,169	2,299,550
Southern Indiana Gas & Elec.	219,263	207,161
Southwestern Power & Light	*1,235,998	*1,142,687
Tennessee Electric Power	936,746	896,569
Texas Power & Light	*554,919	*503,027
Utah Power & Light	*846,245	*795,488
Washington Water Power	519,026	513,706
York Utilities	14,642	14,523

* July. † Includes other income.

Fight Is Still Active for Narragansett Control

Efforts of banking interests identified with Bodell & Company, Providence, R. I., to obtain control of the stock of the Narragansett Electric Lighting Company of that city for the purpose of bringing about a merger with the United Electric Railways have led to the formation of a stockholders' protective committee in the Narragansett company which is seeking the deposit of shares in order better to maintain the present independence. On Monday of this week the personnel of this protective committee was announced. It consists of W. A. Viall, B. S. Watson and T. F. I. McDonnell of Providence, G. B. Allen and R. S. Emerson of Pawtucket, R. I., and H. A. Smith, Hartford, Conn. The committee, in a letter to stockholders, said in part:

"The financial policy of the Narragansett company has been attacked by the proponents of the proposed merger in an attempt to depreciate the value of the company's properties, render it more difficult to do its future financing and affect the value of the Narragansett stock. . . . The directors of your company have already expressed their belief that your stock is worth more than the price recently offered for it and that the financial policy of the company is sound. The stock purchased by the merger proponents is controlled by one interest acting as a unit and under one head, and whether you desire to preserve the Narragansett company as an independent company or to get the full value of your stock in case you may at any time desire to sell, your interests can, it is believed, be best served by your acting in conjunction with other shareholders of the company for your mutual advantage. This can be accomplished by depositing your stock with the Industrial Trust Company (Providence) as depositary for disposition as you may direct. . . . It is expected that the protective committee will have definite proposals to submit to you on or before Nov. 1, 1926."

Central Stations Raise $893,706,482 Since January

New public offerings of electric light and power securities during the first nine months of 1926 reached a total of $893,706,482, as compared with $743,967,010 for the corresponding period of 1925. These figures include no foreign loans, nor do they include local sales to customers and employees. The past month — September — contributed only $10,985,000 to this sum, one of the smallest totals on record. In the previous month new issues amounted to $49,759,000, and in September, 1925, new issues totaled $41,985,000. The new offerings decreased not only in number but also in volume. Only six utility companies participated in the month's activities and not a single issue reached the five-million-dollar mark. The largest individual loan was floated by the Tide Water Power Company in the form of first lien and refunding mortgage gold bonds amounting to $3,750,000, priced at 98¾ and interest, to yield about 5.45 per cent. September a year ago was also a dull month—in fact, the dullest of the year—though its total of $41,985,000 was substantially in excess of that recorded this past month.

Of the six new issues, four were long-term, one was short-term and the other was an issue maturing serially. The average rate of return yielded the investor struck the lowest point reached thus far this year—5.27 per cent. The yield had been on the up grade since June, when 5.39 was recorded. In July the new offerings netted a yield of 5.54, and in August the 6 per cent point was reached.

It is interesting to note that during September three sizable foreign loans were raised in this country, one by a Canadian company, the Shawinigan Water & Power Company, and the other two by German companies, the Leipzig companies and the Siemens group. These three issues, not included in our tabulation, amounted to a total of $30,000,000.

Dividends Declared

The quarterly dividends listed below have been announced by electric light and power and electrical manufacturing companies:

Name of Company	Per Cent	When Payable
California Electric Generating, pf.	1½	Oct. 1
Central Power & Light, pf.	1¾	Nov. 1
Commonwealth Power, pf.	$1.50	Nov. 1
Commonwealth Power, com.	.50	Nov. 1
Electric Lt. & Pwr. of Abington & Rockland	.50	Oct. 1
Elmira Water, Light & R.R., 1st pf.	1½	Sept. 30
Elmira Water, Light & RR., 2nd pf.	1½	Sept. 30
General Public Service, conv. pf.	$1.75	Nov. 1
Greenfield Elec. Lt. & Pwr., com.	$2.50	Sept. 30
Greenfield Elec. Lt. & Pwr., pf.	.37½	Sept. 30
Harrisburg Light & Power, pf.	1½	Sept. 30
Johns-Manville	.75	Oct. 1
Kansas Electric Power, pf.	1¾	Oct. 1
Memphis Power & Light, pf.	$1.75	Oct. 1
Nevada-Calif. Elec., pf.	1¾	Nov. 1
New Orleans Public Service, pf.	$1.75	Oct. 1
Northern Indian Pub. Serv., 6% pf.	1½	Oct. 14
Northern Indian Pub. Serv., 7% pf.	1¾	Oct. 14
Ohio Brass, com.	$1	Oct. 15
Ohio Brass, com. (extra)	$1	Oct. 15
Ohio Brass, pf.	1½	Oct. 15
Ohio Edison, 6% pf.	$1.50	Dec. 1
Ohio Edison 6.6% pf.	$1.65	Dec. 1
Ohio Edison 7% pf.	$1.75	Dec. 1
Ohio Edison 6.6% pf.*	.55	Oct. 1
Ohio Edison 6.6% pf.*	.55	Nov. 1
Ohio Edison 6.6% pf.*	.55	Dec. 1
Pittsburgh Transformer, pf.	2	Oct. 1
Pittsburgh Transformer, com.	2	Oct. 1
Pittsburgh Transformer, com. (extra)	2	Oct. 1
Southern Canada Pwr., pf.	1½	Oct. 15
Southwest Power, pf.	1¾	Oct. 1
Turners Falls Pwr. & Elec.	$2	Sept. 30
Wagner Electric, pf.	1¾	Oct. 1
Western Power, pf.	1¾	Oct. 15
West Kootenay Pwr. & Lt., pf.	1¾	Oct. 1
Worcester Electric Lt.	$1	Sept. 30

* Extra.

Security Issues of Electric Service Companies in September

Name of Company	Amount of Issue	Period Years	Class	Purpose	Interest Rate	Price	Per Cent Yield
City of Seattle Municipal Light & Power System	$2,000,000	11–30	Gold bonds	Additions and extensions	5	100	5
Kansas Electric Power Co.	1,000,000	25	First mortgage gold bonds	Extensions and additions and for other corporate purposes	5	96	5.30
Tide Water Power Co.	3,750,000	3	First lien and refunding mortgage gold bonds, series C	To provide funds for expenditures made and for additional expenditures to be made	5	98¾	5.45
Broad River Power Co.	1,000,000	28	First and refunding mortgage gold bonds, series A	Additions, construction and for other corporate purposes	5	93½	5.45
Northern New York Utilities, Inc.	1,235,000	29	First lien and refunding gold bonds, series E	To reimburse company's treasury in part for expenditures, for additions and extensions	5	99	5.06
Dallas Power & Light Co.	2,000,000	26	First mortgage gold bonds, series C		5	100	5
Total	$10,985,000						

Manufacturing and Markets

Scheduling Fan Business by Weather*

Discussion of the Effect of Season and Weather on Electric Fan Sales, Showing the Way in Which These Influences Have Been Charted

BY GEORGE T. FIELDING
General Electric Company

ELECTRIC fans are a good deal like summer drinks. No amount of advertising or selling effort will induce people to purchase them until conditions are just right. When those conditions strike, lucky is the concern which has the right assortment ready at the right place and in the proper quantity—for the public will be served. And unlucky is the house which distributes too many fans to Wisconsin and too few to Alabama, or totals a heavy carry-over into the following season, for electric fans run into a considerable investment.

The problem of setting a dependable schedule for fans not long ago was put up to our commercial research section, which at that time was under my direction. We attacked this problem upon the theory that every sales area in the United States has its own average fan season, which season would be disclosed by careful analysis of Weather Bureau records extending over a period of years, if properly interpreted. We accordingly selected 132 Weather Bureau stations in the United States in or near important commercial centers and joined forces with the Weather Bureau experts in an attempt to ascertain when the season for electric fans starts in each of the places and how long it annually extends, based upon weather observations over long periods of years.

Consultation with the leading Weather Bureau authorities and other eminent meteorologists confirmed the fact that fan weather is controlled mainly by two factors — temperature and humidity. It was further established, through both consultation and test, that the combination of 70-deg. temperature with 70-deg. humidity would start those who had electric fans to using them and those who did not possess them to wanting them. Furthermore, it was found that any temperature above 85 deg. would ordinarily produce the same effect irrespective of humidity.

Proceeding upon this broad basis, it was possible graphically to portray both the occurrence and extent of the fan season in these 132 different sales areas under normal conditions, averaged from Weather Bureau records running back from 25 to 46 years. These charts contained many surprises for some of us who had entertained rather vague ideas of weather conditions obtaining in remote sections of the country. One of the first things the analysis brought up, for example, was that San Francisco had no fan weather, yet we had been expecting our dealers to sell larger quantities of fans there. This puzzled us at first until the manager of our San Francisco office came in from the West one day and confirmed the charts by pointing out that the only warm weather in the city of San Francisco was for a short period around noonday and that any other time the sight of electric fans would make people turn up their coat collars.

Contrasted with this, we found Sacramento, only 88 miles inland, showing about 27 weeks of fan weather. At Helena, Mont., which we in the East ordinarily think of as being rather dry and warm in the summer time, we found only three weeks of fan weather, because of the high altitude. At Houston, Tex., the records show 34 weeks, and so on. The weighted average for the country, as a whole, was something like 20 weeks.

We distributed over 12,000 of these charts to our fan dealers through our wholesalers. They excited a great deal of interest and argument. Some of them took them as forecasts and when the weather did not perform according to schedule said they were no good. Others made intelligent use of them in planning their summer sales campaigns. One dealer in New York had colored enlargements made and posted in his show window. Wherever these charts were displayed to the public they attracted lively attention, for every one is interested in the weather.

Briefly summarizing the advantages of this study to us, we found in the first place that it meant everything to get something down at last in black and white about the weather as controlling fan sales. It was the first time that any of us concerned with the marketing of electric fans had had this powerful but elusive factor reduced to definite, tangible form so that we could study it and more scientifically gage our sales possibilities.

It helped our advertising department intelligently to proportion and time local newspaper publicity in all parts of the United States so that it would be most effective, even to the setting of approximate release dates for each place months in advance. It assisted us in conjunction with other factors in analyzing our fan markets and setting sales quotas for all parts of the United States, but probably the most important effect of all was the fan consciousness, if you please, these charts awakened throughout our distributing channels. They established a definite place in the dealer's plans for his annual fan campaign, whereas he had previously been inclined to handle this item in a more or less haphazard manner.

There was, indeed, a large amount of

*An address before the thirteenth annual national business conference at Babson Park, Mass., Sept. 15, 1926.

Delinquent Electrical Accounts

(Data Supplied by National Electrical Credit Association)

NUMBER OF ACCOUNTS REPORTED

Division	August 1925	August 1926	Per Cent Increase or Decrease	Eight Months 1925	Eight Months 1926	Per Cent Increase or Decrease
New York	306	280	—8.5	3,073	3,009	—2.08
Middle and Southern Atlantic States	224	183	—18.3	1,863	1,548	—16.9
New England	74	91	+22.9	684	999	+46.2
Pacific Coast	15	15	.....	148	198	+33.7
Central	808	798	—.99	7,150	7,178	+.39
Total	1,425	1,367	—4	12,818	12,812	—.05

TOTAL AMOUNTS REPORTED

Division	August 1925	August 1926	Per Cent Increase or Decrease	Eight Months 1925	Eight Months 1926	Per Cent Increase or Decrease
New York	$36,376	$39,624	+8.9	$444,891	$441,399	—.78
Middle and Southern Atlantic States	19,957	30,809	+54.3	251,701	170,293	—28.7
New England	7,276	8,684	+19.4	83,037	69,246	—16.7
Pacific Coast	1,577	2,858	+81.2	23,386	34,302	+46.6
Central	88,238	83,238	—5.7	854,999	777,162	—9.1
Total	$153,424	$165,213	+7.68	$1,658,014	$1,501,402	—9.45

AVERAGE AMOUNTS

Division	August 1925	August 1926	Eight Months 1925	Eight Months 1926
New York	$119	$141	$144	$146
Middle and Southern Atlantic States	88	168	135	116
New England	98	95	121	69
Pacific Coast	105	190	158	173
Central	109	104	120	108

work involved in the compiling, interpreting and charting of the specific data represented by this study, but we feel it has been worth all it cost. We cannot say enough for the generous assistance tendered us by the various officials and individuals connected with the United States Weather Bureau. The great thing we have learned is that there are reservoirs of valuable information down at Washington which business men have not yet tapped. There is no reason why the Weather Bureau should not prove as useful to commerce as it has proved to agriculture, for all branches of commerce are affected by weather or climate directly or indirectly. Our weather studies in connection with electric fans have brought in letters from manufacturers of rubber goods, cosmetics, radio sets and others indicating a rising commercial interest in this subject.

August Operations 4.2 per Cent Above Normal

Consumption of Electrical Energy Indicates Prosperous Conditions in Electrical Manufacturing Industry—Productive Activity in August 6.2 per Cent Over July

THE ELECTRICAL WORLD presents herewith a new service to its readers in the form of a barometer of monthly operations in the electrical manufacturing plants of the nation. This barometric index extends back to 1913. The activity of the electrical manufacturing plants during the period from 1913 through December, 1925, is based upon the activity of other primary industries weighted in accordance with their influence on the activity of the electrical manufacturing industry. The activity of the electrical manufacturing plants during the present year is based upon the consumption of electrical energy by a high percentage of those plants at present under operation, including both large and small plants, and scattered throughout the nation. This basis will be continued in the future, the barometer being issued each month as soon after the close of the month as it is possible to obtain the basic information on operations. The ELECTRICAL WORLD has received a most cordial response from the manufacturing companies and central-station companies in its request for the basic data, and the barometer as at present issued is believed to picture very clearly the activity within the electrical manufacturing plants of the nation.

The points on the actual monthly operations curve have been corrected for seasonal variation and referred to an average normal for the year. The installed generator rating of the central-station generating plants of the country is assumed to indicate the normal growth of operations in the electrical manufacturing industry. The difference between the "index of normal monthly operations" and the "index of actual monthly operations" gives the monthly activity in per cent above or below the estimated normal activity for the month in question.

During the past thirteen years the electrical manufacturing industry has experienced five cycles of industrial activity, the longest extending over 55 months, from the middle of 1915 to the opening of 1920, the war years. The present cycle started in November, 1925, and the industry is still in the prosperity lobe of the industrial cycle.

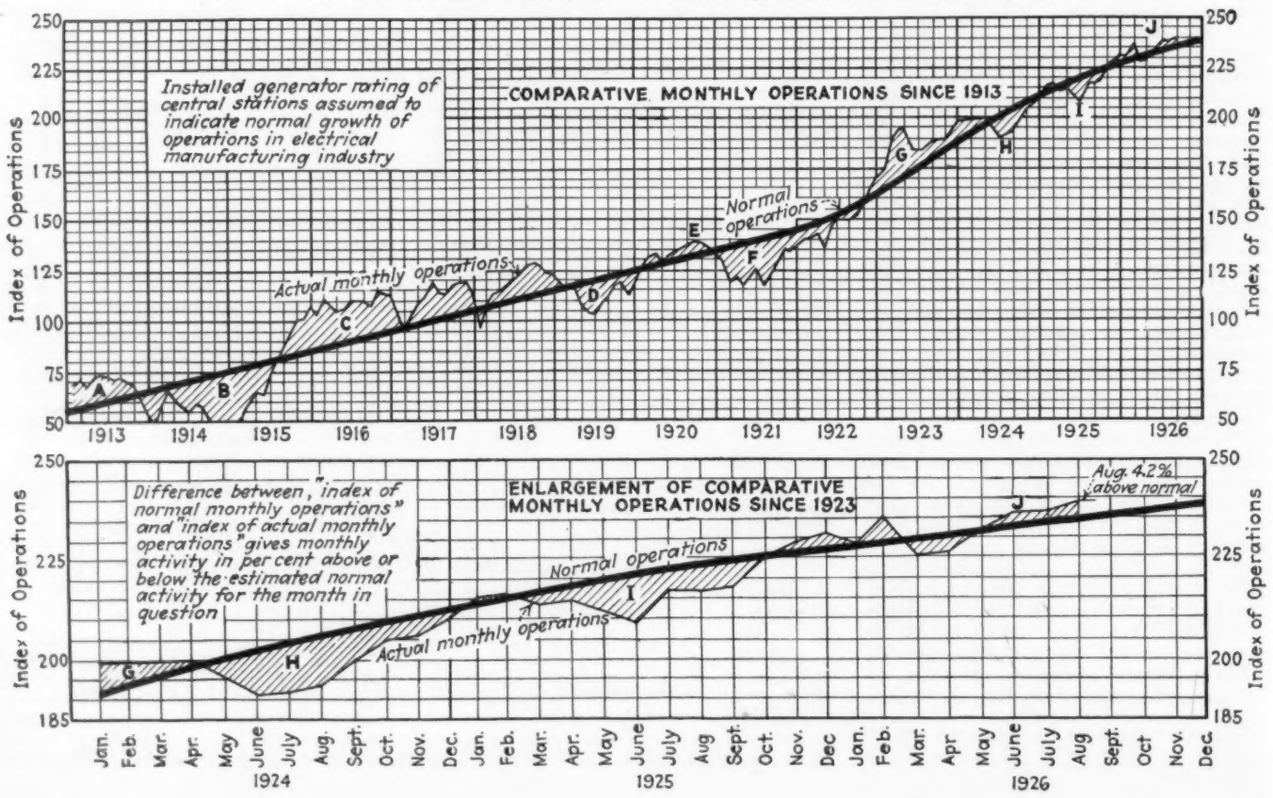
Activity in the electrical manufacturing plants since the opening of the year has been slightly above normal, with the exception of March and April, when the reports on energy consumption indicated a temporary slump in operations. The reports for the month of August indicate that the industry was operating at 4.2 per cent above the estimated normal for that month. In July operations were 3.6 per cent and in June 4.5 per cent above the estimated normal for that month. A comparison of the activities during July and August without correction for seasonal variation indicates that actual production operations in August were 6.2 per cent over those of July.

These barometers of activity in the electrical manufacturing industry will, as just stated, be issued monthly. Reprints will be available upon application to the ELECTRICAL WORLD.

What Is Meant by "Infringement of Patent"?

"Infringement of a patent" is an erroneous phrase, according to a dictum of the United States District Court for the Eastern District of New York, in a

***Electrical World* Barometer of Activity in the Electrical Manufacturing Industry**
(Corrected for seasonal variation and referred to an average monthly normal for the year)



suit brought by the Radio Corporation of America against the Twentieth Century Radio Corporation, because it is the "claim" or "claims" of the patent that is or are infringed, and the "claim" becomes the cause of action against the alleged infringer. Each claim is alleged to be a complete and independent invention. A patent, then, may be valid as to a single claim and invalid as to another. Claims broader than the described invention are void. When two inventors improve upon the former art each in his own distinct and separate way is entitled to credit for his own improvements. With these principles in mind, the plaintiffs patents No. 1,183,875, issued to Ralph Hartley, and No. 1,334,118, to Chester Rice, were not invalidated by the court's finding that claims 1 and 2 of the former, and claims 1, 2 and 3 of the latter were too broad, anticipated and void.

Chilean Copper Is Going to Europe Direct

Agitation in this country for a tariff on copper is said to be one of the reasons influencing American producers of that metal in Chile to ship to Europe direct instead of via the United States. The extent to which resort is being made to direct shipments is indicated by the decrease of imports of Chilean copper into the United States from 115,000 tons in 1924 to 74,000 tons in 1925. This practice also robs the foreign critics of the copper export association of one of the points on which they have placed great reliance. In trying to establish that such an organization would be a great octopus they have included the Chilean production of American companies in their estimates of the volume of business which would be handled through the association.

Business Conditions

THERE was little change in the general market situation last week. Buying is active in New England with much good business in prospect. New York is still comparatively quiet, though industrial business is picking up. The first orders for restoring the devastation wrought by the Florida hurricane were recorded in the Southeastern section and are quickening an already active market. The Middle West is busy and optimistic, with active demand from the utilities, the steel industry and mines. There is brisk business on the Pacific Coast. An interesting incident of the week was a sudden demand for electric motors in the cities of Seattle, Portland, Tacoma and Spokane. Owing to a government ruling that requires the wiping of all apples before packing, more than 600 motors of half, three-quarters and one horsepower were immediately required and the local market was cleaned out.

Power-plant equipment and central-station supplies were the outstanding items in New England, and small motors are running 25 per cent ahead of last year. Construction materials are moving well, but appliance sales are spotty. There were good sales of motors up to 10 hp. in the New York district, but central-station buying was below normal. Brisk demand for line material marked the week in the Southwest, and there was good movement in transformers and switchboards. Many well-scattered, sizable contracts are being let. Heavy maintenance purchases were made by the utilities in the Middle West, where jobbers' sales are excellent and building continues to provide a good market. The coal-mining sections are more active. Following the price flurry of last week staples have sold heavily on the Pacific Coast. There has been considerable buying by the power companies.

A Dull Week in the Metal Market

There has been little life in the nonferrous metal market this week. Following two fairly good weeks, copper has been exceedingly dull in both foreign and domestic markets. It is known that consumers have very small stocks of raw material, but they show little interest in the metal at any price. In the Connecticut Valley 14.25 cents delivered has been the prevailing price, though some sales have reached 14.20 cents. Prices in the Middle West have run from 14.35 cents to 14.45 cents. Deliveries are principally for October.

No change has been made in the American Smelting & Refining Company's contract price for lead, which stands at 8.75 cents, New York, but the market is somewhat weaker following the slight decline in London prices. Orders have been for small tonnage, for prompt or October delivery, with inactive buying. Consumption continues excellent, however, and if the market changes for the better, sellers will be hard pushed. Zinc has also been quiet, with prices ranging from 7.35 cents to 7.40 cents for prime Western. The demand for high grade is good, however.

NEW YORK METAL MARKET PRICES

	Sept. 22, 1926 Cents per Pound	Sept. 29, 1926 Cents per Pound
Copper electrolytic	14.274	14⅛
Lead, Am. S. & R. price	8.75	8¾
Antimony	16–14¾	14¾
Nickel, ingot	35	35
Zinc spots	7.75	7⅝
Tin, Straits	69.125	70¼
Aluminum, 99 per cent	27	27

Base copper price Sept. 22, 1926, 16¼ cents.

New England Electrical Sales Remain Steady

Power-plant equipment and central-station supplies are outstanding items of interest in the New England district. New equipment for a Virginia plant, consisting of a 30,000-kw. turbo-generator and auxiliaries amounting to about $450,000, has just been ordered, in addition, supplies for a 6-mile transmission line, 33,000-volt, will be purchased shortly. Announcement of the award for a 2,500-hp. waterwheel generator for southern New Hampshire is expected soon, and negotiations for several short power-line extensions are about to be closed. Insulators and switching apparatus sales are steady and, on the whole, in greater volume than at this time last year. Small-motor sales are progressing and orders from textile mills are increasing in number. According to one manufacturer, sales of small motors for this district are about 25 per cent ahead in volume as compared with last year.

New-construction materials are moving in good volume; wiring contracts are reported in good number throughout this district, and the demand for wiring devices, wire, cable and hardware is strong. Household appliance sales are spotty. Owing to a number of local sales campaigns, encouraging returns are reported for washers, flatirons and portables. On the other hand, jobbers record some slackening up in retail trade. This feature is offset by a rapidly growing call for radio accessories.

Prospects for a continuation of encouraging trade in electrical supplies and equipment for the remainder of this year are bright; inquiries for deliveries and quotations keep up on a high level; much new construction is in prospect, and present status of building in this district is sound. New contracts totaling more than $12,000,000 were awarded in this district during the past week.

Active Buying in Middle West Market

Regardless of storms, floods and large property losses, business throughout the Middle West continues uninterrupted and optimism is prevalent. That a large volume of raw and manufactured products is being consumed is indicated by the enormous business of the railroads. The steel industry is establishing a good record for the month and all indications point to sustained prosperity. Building activity continues, with many large structures under construction or projected. Increased activity in the coal-mining sections is noticeable. The various utility companies are active, with some purchasing of apparatus and quite a large amount of construction work. Maintenance purchases are quite heavy. Among the interesting orders placed this week were the following items: An addition to coal-handling equipment to cost $350,000, a forty-thousand-dollar foundation for entrance draft fans, several multivane fans, two 6-in. motor-driven heater drain pumps, thirteen 100-kva. and twelve 75-kva. distribution transformers.

Jobbers' sales are normally good in the Chicago district. There has been a good demand for all appliances, particularly automatic toasters, waffle irons and heaters. Threadless couplings are moving in large quantities and there is quite a demand for conduit and wire.

In the St. Louis section, general business for the past week in most lines has been above normal, and jobbers report 20 to 25 per cent increase over last month on heating appliances, radio, lamps and lighting fixtures. Very little activity is reported in pole-line and con-

struction materials. A number of medium-sized motors have been shipped to the lead belt of southeast Missouri, and one contract was signed for a 5,000-kw. turbo-generator by one of the large lead-producing companies. While there seems to be a slackening off in buying on the part of industrial concerns and no large orders have been placed for central-station equipment in St. Louis, the outlook is reported by manufacturers to be excellent. Inquiries for transformers, motors and generating apparatus are being received, but there is a little hesitation in closing contracts.

Brisk Business on the Pacific Coast

Jobbers report brisk business through the California district in the wiring staples affected by the recent price flurry. Half-inch galvanized conduit is selling to dealers at $6.25 per 100 ft. instead of $6.75 per 100 ft., and No. 14 single-braid solid-rubber-covered wire at $6.20 per 1,000 ft. in coil lots as compared with $6.35 per 1,000 ft. in 25,000-ft. lots. Rubber-covered wire prices are weaker. Steel prices, however, show signs of stiffening, and schedule material prices are firm. Power company orders this week include three carloads of poles, 12,000 gal. of creosote and 30,000 ft. of wire. Inquiries from telephone companies include 8,000 lb. No. 12 bare copper wire and 600 25-ft. treated poles. Interesting industrial and miscellaneous business placed this week includes a three-thousand-dollar rigid-conduit order for the San Francisco harbor commissioners, 200 lighting units for a Salinas hospital, 1,600 battery switches, 100 small motors for apple-paring machines and 10,000 ft. of ½-in. galvanized conduit for a lumber company. Railroad orders include 20,000 ft. double-galvanized strand wire for a Sacramento district electric railroad, 3,000 dry batteries and 8,000 ft. of 25-pair lead-covered cable. Motor and machinery orders include $1,500 worth of ½-hp. and ¾-hp. motor for oil burners, with $2,000 in small-motor parts, 2,500 house-type watt-hour meters, and $4,000 worth of motors of from 15 hp. to 40 hp. Nevada business has been good in all lines.

Jobbers' stocks of single-phase motors in ½-hp., ¾-hp. and 1-hp. sizes in Seattle, Portland, Tacoma and Spokane are reported practically cleaned out following the enforcement of the government regulation requiring apple growers in Yakima, Wenatchee, Chelan and Kennewick district in eastern Washington to wipe before packing all apples sprayed during the season with arsenic and lead. Approximately 600 motors that will be used on wiping machines have been sold in the past two weeks. Seattle sales reported this week include also two 1,250-hp. motors for grinding machines in a pulp and paper mill and several smaller orders for motors from industrial sources. The city of Seattle bought in excess of $40,000 worth of impregnated-paper and rubber-insulated, lead-covered cable and approximately $9,000 worth of weatherproof wire. Orders in prospect include approximately 20 motors from 40 hp. down for the six-story Orpheum Theater and office building now being constructed and several other important motor installations. Wire schedule material and lamp sales are showing continued improvement.

Market Continues Strong in Southeastern States

Central-station activities continue to be reflected in the good volume of line and substation equipment business, one manufacturer being in receipt last week of three orders for materials going into one line in middle south Georgia, including substation equipment and transformers, $70,000; line materials, $40,000, and switchboards, $10,000. A satisfactory volume of small or moderate-size orders is also reported from that section. Also, as a result of the Florida storm damage some sizable orders for line materials, transformers, "white way" equipment and incandescent lamps have already been received in the past few days, with more business in prospect from this territory for replacement work.

Three industrial electrification jobs in the Carolinas have been let within the past two weeks, and other small electrification contracts are pending over the territory generally. Contracts were let last week on a construction job in Chattanooga amounting to $750,000, on which the electrical work will amount to approximately $30,000. Wire and cable business is better than for several months past, when conditions were somewhat spotty, though no outstanding large orders have been reported of late. Elevator activities are normal with the business scattered over the territory as a whole. One interesting recent contract was closed for a hundred-thousand-dollar elevator installation in an Alabama city. Battery business is reported steady and in good volume. A contract for $4,000 worth of batteries for remote-control equipment is to be let this week, and orders on replacement batteries for storage-battery locomotives are also pending.

Incandescent-lamp sales are active, one large power company having sold 43,000 of the 60-watt type during a campaign in August. Several large similar campaigns are now under way and meeting with considerable success. Another power company in recent minor campaigns sold 51 electric ranges, 109 percolators and 529 flatirons. Coincident with awakened fall activities in radio equipment lines, a large Southeastern power company announces its entry into the radio merchandising field and the prospects for the entire line over the territory are bright.

Industrial Demand More Active in New York

Central-station buying in the New York district is slow. Switching apparatus and transformers are very quiet, and orders for pole-line hardware, insulators, etc., both for new construction and general maintenance work, are considerably below normal. There is some activity in the railway field, one company asking for quotations on a 20,000-kva. turbo-generator and a considerable amount of substation apparatus, including rotary converters, transformers, etc. In the industrial field the demand for motors up to 10 hp. continues strong, with a considerable volume of sales to pump and machinery manufacturers. An increasing demand, too, is apparent by sewing machine manufacturers. Control apparatus sales fell off during the last few days.

Activities of the Trade

Benjamin Electric's New Line of Electric Ranges

The Benjamin Electric Manufacturing Company, 120 South Sangamon Street, Chicago, announces that it is now manufacturing a line of electric ranges known as the "Crysteel" ranges. The company states that these ranges are made under the patents and design of Moffats, Ltd., of Weston, Ontario, Canada, which has had more than 40 years' experience in the exclusive manufacture of ranges and 15 years devoted to making electric ranges, 80,000 of which are in daily use throughout the world. The Benjamin company, besides making panelboards, industrial lighting equipment, traffic signals and other electrical equipment, has also manufactured "Crysteel" porcelain-enameled parts by the thousand for every kind of stove and range.

Hamond Joins Cotton Organization

George H. Hamond has left the employ of the Greene Electric Sales Company, Boston, and become associated with C. A. Cotton, manufacturers' agent, with offices at 135 High Street, Boston. Mr. Hamond will act as agent for the Magnus-Reel Electric Products Corporation, New York, manufacturer of attachment plugs and other wiring devices, and he will also assist Mr. Cotton in his representation of the Pacific Electric Manufacturing Company, Burke Electric Company, Baldor Electric Company and other houses.

Lindsley Brothers Company to Retire from Cedar-Pole Business

The Lindsley Brothers Company of Spokane, Minneapolis, Chicago, New York and Nelson, B. C., announces that it has sold out its pole-treating plant at Minneapolis and will eventually retire from the cedar-pole business. This company has been in that business for more than 30 years, having entered the business in Menominee, Mich., in 1895 as Lindsley Brothers Company, starting the Western business of the Lindsley Brothers Company in 1899. It will maintain its Spokane office for an indefinite period in order to liquidate its affairs.

The company has sold all its poles and the Minneapolis business to the M. L. Bruce Company of Sandpoint.

Idaho, which in turn is represented by the Joslyn Manufacturing & Supply Company of Chicago.

The Black & Decker Manufacturing Company, Towson, Md., announces that it is now offering a ½-in. special ball-bearing portable electric drill.

Pass & Seymour, Inc., Solvay, N. Y., manufacturers of wiring devices, are placing on the market a new bracket-type receptacle with the standard convenience outlet.

The American Brown Boveri Electric Corporation, 165 Broadway, New York, announces that F. L. Townsend has been transferred to the New York office of the company and will conduct the sales of automatic voltage regulators, current-limiting regulators, automatic synchronizers and other central-station equipment.

The General Electric Company is said to have plans under way for the consolidation of all electric locomotive work at its shops at Erie, Pa. It is said that additional equipment will be installed and an increased working force employed.

The Link-Belt Company, 910 South Michigan Avenue, Chicago, announces the opening of its thirty-fourth office, and the third within the State of New York, at 107 Foster Building, 131 Genesee Street, Utica, N. Y. This office will be devoted especially to the sale of Link-Belt silent chain and Link-Belt roller chain and will be in charge of F. P. Hermann, Jr., formerly associated with the New York office.

The Sundh Electric Company, Inc., 5 Avenue C, Newark, N. J., manufacturer of control apparatus, has just completed plans for adding 60 per cent more factory space. Work has already been started and the company expects to have the additional floor space in use by the end of December. It is only within the past year that the company had provided additional factory facilities.

The Rutenber Electric Company, Marion, Ind., manufacturer of household appliances, announces that the Backmeier Sales Company, Palace Theater Building, Cincinnati, has been appointed its Southern representative and will cover North Carolina, South Carolina, Georgia and Florida.

The Edison Electric Appliance Company, 5600 West Taylor Street, Chicago, has purchased the land and buildings of the Vitanola Talking Machine Company on South Fifty-second Avenue near West Nineteenth Street.

The Graybar Electric Company, 100 East Forty-second Street, New York, announces several changes in management and personnel of its distributing houses in Southern territory. George T. Marchmont, at present manager of the Richmond (Va.) branch house, has been appointed Southern district manager with headquarters at Atlanta. Mr. Marchmont succeeds Howard Hall, who has been promoted to the staff of Frank A. Ketcham, executive vice-president of the company, with headquarters at New York. As manager of the Southern district, Mr. Marchmont will have under his supervision the Graybar distributing houses at Atlanta, Birmingham, New Orleans, Savannah, Jacksonville, Miami and Tampa. J. H. Pearson, Jr., manager of the Charlotte (N. C.) house, will succeed Mr. Marchmont in the management of the Richmond house. Succeeding Mr. Pearson at Charlotte will be Moorman C. Beckner, at present a member of the sales staff of the Richmond house. The company also announces the appointment of E. E. Martin as manager of the Syracuse (N. Y.) branch house, succeeding E. D. Towler, who has been appointed assistant sales manager at New York. Mr. Martin in his new capacity will report to the manager of the Buffalo branch house.

General Plastics Inc., North Tonawanda, N. Y., manufacturer of "Durez" products, has increased its sales force by the appointment of Thomas A. Ryan and Herbert S. Spencer. Mr. Spencer will have charge of advertising.

The Century Electric Company announces that on Oct. 1 its district sales office at Los Angeles will be moved to 822 Standard Oil Building, 605 West Tenth Street.

The Lincoln Electric Company, Cleveland, announces the appointment of Dorsey C. Anderson as general sales manager, with headquarters at Cleveland. As district sales manager in Philadelphia, Mr. Anderson formerly directed the Lincoln sales activity on the Atlantic seaboard from Boston to Baltimore, inclusive.

The Jas. R. Kearney Corporation, St. Louis, announces that Elon J. De Right has been appointed special sales engineer. Mr. De Right was formerly superintendent of high-line construction of the Kansas City Light & Power Company.

The Trumbull Electric Manufacturing Company, Plainville, Conn., has leased the first floor of the plant of the Bristol Manufacturing Company and will utilize it at present for the storage of raw materials. Later it may be used to store finished goods.

The Strand & Sweet Manufacturing Company, Winsted, Conn., manufacturer of magnet wire, is continuing the expansion program at its plant and has just awarded a new contract for a two-story addition which will be 50 ft. x 85 ft.

The Grant Sales Company, Minneapolis, representative of the Fibroc Insulation Company, Valparaiso, Ind., announces its removal to new and larger quarters at 1004 Marquette Avenue.

New Equipment Available

Diesel Engines

Diesel engines in ratings of 480 hp., 600 hp. and 720 hp., and of the two-cycle, single-acting, port-scavenging, airless-injection type, have been placed on the market by Fairbanks, Morse & Company, Chicago. These engines also utilize the two-stage combustion principle and are provided with a pressure-lubricating system throughout, a reversible and centralized control and a built-in scavenging pump. Manufacturers say that these units are very compact and also accessible, that they are built to withstand the hardest service with a minimum of operating attention, and that the fuel economy is excellent.

The engine is started by means of a large hand wheel. When this hand wheel is thrown to the starting position, compressed air at about 250 lb. pressure is admitted to the cylinders in proper order so that the engine begins to rotate. The hand wheel is then thrown to the running position and combustion of the charge takes place. Speed control is obtained by means of a smaller hand wheel placed on the governor which changes the setting of the governor spring. An indicating pointer just above the rim of this hand wheel shows whether the change in speed is slower or faster. This speed control is used when paralleling two or more Diesel-electric generating sets, or it may be used for drives requiring speed variations. It is necessary to rotate this hand wheel through several revolutions to obtain any considerable variation in the speed of the engine, so that another small controller, placed on the governor, permits rapid variations in speed. A simple fuel pump is required for each cylinder, and since high-pressure air is not used in connection with the injection of fuel, the mechanism required for starting up the engine is not complicated.

Quick-Break Primary 'Disconnect'

A quick-break primary "disconnect" designed for use on circuits of 6,600 volts and under and having a capacity of 400 amp. has been placed on the market by the Line Material Company, South Milwaukee, Wis. The quick-break blade is a third blade inserted between two regular blades, and the center portion of the regular double-contact clip has been split to receive the quick-break blade when closed. Copper guides on the regular blades keep the quick-break blade in alignment. The switch blade is hinged on a third insulator so that when the switch is open the blade is absolutely dead. The blade can be turned down through a slot in the bottom of the box and the door closed. This slot in the bottom of the box is equipped with a small steel plate, which is automatically shut by a spring hinge which keeps the opening closed when the blade is in the closed position.

The quick-break blade remains in the contact clips until the regular blade is pulled 4 in. from the upper contact. A brass-wire spring provides a cam action at the hinge end and accelerates the motion of the quick-break blade to lift it out of its contacts. The switch box can be furnished with two different types of mounting. Galvanized-steel cross-arm straps or galvanized-steel angles slotted to accommodate cross-arm straps are available.

New Trade Literature

INTERIOR LIGHTING UNITS.—Bulletin No. 47-B issued by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., describes and illustrates the various types of the "Sol-Luz Luminaire" and also the "Sol-Lux Junior" type. This bulletin also announces the development of two new lighting units, the "Sollaire" and the "Sol-Lux Windo-Flood," a unit for supplementing window lighting. Several line cuts showing the mechanical features of the various lighting units and engineering data on the "Sol-Lux Luminaires," the "Sol-Lux Junior" and the "Sollaire" are included.

AIR AND WATER HEATERS.—The Edison Electric Appliance Company, Inc., 5600 West Taylor Street, Chicago, is distributing catalog supplements describing a new line of "Hotpoint" air heaters, model A38 portable heaters, model A35 built-in heaters, and model A39 built-in bathroom radiant heaters, and tank storage-type water heaters respectively. A bulletin issued by the company calls attention to another new "Hotpoint" electric range, the RA95 white, for small homes, and attention is called also to eleven new features for the RS67 De Luxe "Hotpoint" electric range.

MATERIAL-HANDLING EQUIPMENT.—The Beaumont skip-lift for handling bulk materials is described in bulletin No. 79, issued by the R. H. Beaumont Company, 319 Arch Street, Philadelphia. A number of illustrations show actual installations of different types. The various types of guide sections available are shown, and the automatic loader, the manually operated loader, the winding machine, the guides and the bucket are each illustrated and described in detail.

ELECTRIC HOISTS.—A new catalog issued by the American Engineering Company, Aramingo and Cumberland Streets, Philadelphia, describes six large new hoists that have been added to its "Lo-Hed" line. These hoists range in capacity up to 24,000 lb. The catalog contains illustrations showing applications of the various types of the "Lo-Hed" hoists and the details of construction of classes "B" and "H." Tables giving the capacities and ratings of all types of the "Lo-Hed" hoists are included.

REFLECTORS.—A bulletin issued by the Wheeler Reflector Company, 275 Congress Street, Boston, calls attention to its "Durex" line, consisting of a reflector and canopy, for industrial and railroad lighting equipment. Tables giving dimensions, etc., of the "Durex" reflectors and canopies, separate units and combinations, are included.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered, further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number:

An agency is desired in Ghent, Belgium (No. 22,267), for radio sets and parts. Purchase is also desired (No. 22,287) of electric refrigerators and snap and knife switches.

An agency is desired in Genoa, Italy (No. 22,253), for electrical portable tools and drills and precision instruments.

Purchase is desired in Monterey, Mexico (No. 22,251), of laundry machinery and equipment.

An agency is desired in Vienna, Austria (No. 22,334), for electrical equipment, machinery of all kinds and small engines; also for spraying and irrigation pumps and garden spraying equipment (No. 22,326).

Purchase is desired in Cologne, Germany (No. 22,304), of metal diaphragms for use in electric horns.

Purchase is desired in Dunedin, New Zealand (No. 22,335), of electric ovens, irons, radiator elements and parts for household appliances.

BIDS ASKED FOR TWO DIESEL-ENGINE-DRIVEN GENERATING UNITS FOR STATE ELECTRIC PLANT, MONTEVIDEO, URUGUAY.—Bids will be received by the Administracion General de las Usinas Electricas del Estado, Montevideo, Uruguay, until Dec. 6 on two electric generating units, each consisting of a Diesel-type engine, directly connected to generator, having a rating of 275 kw. and 125 kw. respectively. A copy of the specifications has been received by the Electrical Equipment Division, Bureau of Foreign and Domestic Commerce, Washington, D. C., and will be lent to firms interested in the order in which requests are received. Refer to Uruguay No. 42,425.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

KEENE, N. H.—Plans are under way for the erection of a transmission line from Keene through Goffstown to Manchester by the Keene Gas & Electric Company to connect the power stations of the Manchester Traction Light & Power Company and the Keene company. The proposed line will also traverse the towns of New Boston, Hillsborough, Antrim and Deering.

MANCHESTER, N. H.—The Manchester Traction, Light & Power Company has awarded the contract for the construction of a hydro-electric development on the Merrimac River to Hooksett, to the Morton C. Tuttle Company, 862 Park Square Building, Boston. The work will consist of repairs to 600 feet of old dam, construction of new spillway section, about 600 ft.; power house, and turbine installation to develop 2,200 hp.

BOSTON, MASS.—Bids will be received by the Transit Department of the City of Boston, 1 Beacon Street, until Oct. 6, for the construction of a sub-power station on Dickens Street, Dorchester.

PITTSFIELD, MASS.—The Berkshire Woolen Company plans to build a hydro-electric power plant at Peck's Lower Mill, for auxiliary service at its mills.

WEYMOUTH, MASS.—Work will soon begin on the erection of the 100,000-volt transmission line between Weymouth and Medway, 30 miles long.

Middle Atlantic States

BINGHAMTON, N. Y.—The Binghamton Light, Heat & Power Company has applied for permission to extend its electric service in Otselic and Harford. It is proposed to extend its line from Cincinnati to the village of South Otselic.

BROOKLYN, N. Y.—Plans are under way by the Brooklyn Edison Company for the construction of a mechanical service and repair building, at Fourth Avenue and Third Street, to cost about $400,000. McKenzie, Voorhees & Gmelin, 342 Madison Avenue, New York, are architects.

HACKETTSTOWN, N. J.—The installation of an ornamental lighting system on Main Street from Monument Avenue to Stiger Street is under consideration by the City Council. Present plans provide for thirty-five lamp standards.

JERSEY CITY, N. J.—Plans have been filed by the Public Service Electric & Gas Company, Newark, for extensions and improvements in its substation on Duffield Avenue, to cost about $40,000.

NEWARK, N. J.—Plans are under consideration by the Merchants Refrigerating Company, 17 Varick Street, New York City, for the construction of a cold storage warehouse at Pennsylvania and Vanderpool Avenues, to cost about $1,500,000.

ALTOONA, PA.—Electric power equipment will be installed in the proposed tank and plate shop, to be built by the Pennsylvania Railroad Company, Philadelphia, to cost about $250,000.

HARMONY, PA.—The Public Service Commission has ordered the Harmony Electric Company to erect a transmission line from Wexford along the Perry highway, covering a distance of about 7,900 feet.

PHILADELPHIA, PA.—Plans are being prepared by the Philadelphia Electric Company for the construction of a new power plant at Ninth and Willow Streets, to cost about $500,000. John T. Windrim, Commonwealth Building, is architect.

PITTSBURGH, PA.—The Duquesne Light Company has applied to the Federal Power Commission for permission to construct a submarine cable across the back channel of the Ohio River at Neville Island.

PITTSBURGH, PA.—The City Council has approved plans for the electrification of the water pumping station on Howard Street, to be carried out under the direction of the Water Bureau. It is also proposed to electrify other pumping stations. Electric service will be furnished by the Duquesne Light Company.

WIOTA, PA.—Arrangements have been made by the Wiota Electric Company with the Edison Light & Power Company, York, for the erection of a transmission line from Spring Grove to Wiota. Electricity will be distributed by the Wiota company. The transmission line will be extended to Lischey's. Wiota has not a post office.

BALTIMORE, MD.—The Chesapeake Manufacturing Company, Barre and Sharp Streets, plans to build a power plant in connection with an addition to its plant, to cost about $70,000.

LYNCHBURG, VA.—The City Council has authorized the installation of five electric control signals on Main Street, to cost about $4,000.

NORFOLK, VA.—The Virginia Electric & Power Company has awarded contract to Stone & Webster, Inc., Boston, for extensions to its power plant and distributing system in Norfolk. The cost is estimated at $5,000,000 and will include one 30,000-kw. turbo-generator, three 1,700-hp. boilers, with coal-handling apparatus, etc.

WASHINGTON, D. C.—Bids will be received by the General Purchasing Officer, Panama Canal, Washington, until Oct. 6, for electrical supplies, including A. W. G. wire, light clusters, lamp guards, receptacles, etc. (Panama Circular 2423.) Also, until Oct. 15, for electrical supplies and fixtures, motors, etc. (Circular 1759).

North Central States

DETROIT, MICH.—The Peninsular Stove Company, Trumbull and Fort Streets, plans to install electric power equipment in a proposed new local plant, to cost about $500,000.

DETROIT, MICH.—Bids will be received by the Board of Water Commisioners, 176 East Jefferson Avenue, until Oct. 6 for furnishing and installing two 5,000 gallons per minute (United States) electric motor driven centrifugal pumping units with auxiliary equipment.

CHARDON, OHIO.—Plans are under way to install an ornamental lighting system around South Park, consisting of twenty-four standards and lamps.

CLEVELAND, OHIO.—Bids will be received at the office of the Commissioner of Purchaser and Supplies, City Hall, until Oct. 8 for weather-proof wire for the Division of Light and Power.

COLUMBUS, OHIO.—The City Council has authorized the installation of ornamental lamps on California Avenue, Crescent Drive, Binns Boulevard, Westmoor Avenue, Roys Avenue and Broad Street.

DAYTON, OHIO.—Bids will be received by the Board of Education until Oct. 8, for three mechanical stokers for the power plant at the Roosevelt high school.

LORAIN, OHIO.—Petitions have been submitted to the City Council asking for the installation of an ornamental lighting system on East Twenty-eighth Street from Broadway to the undercut.

ST. BERNARD, OHIO.—Plans have been filed by the Proctor & Gamble Company for the construction of a substation at its local soap plant.

COLUMBIA, KY.—The Kentucky Central Electric Company, which has purchased the plant of the Columbia Lighting Company, has started work on the construction of a new power plant on Campbellsville Street in the mill district.

SEBREE, KY.—The General Light & Power Company, 231 South La Salle Street, Chicago, has purchased a franchise giving the company the right to erect transmission lines across and along the highways in Hopkins County. The company will erect a power line in North Hopkins.

SOMERSET, KY.—Surveys are being made by the Kentucky Utilities Company, Louisville, for the erection of a transmission line between Somerset and Stanford to connect both cities with the Dix River dam plant and the Pineville steam plant.

GEORGETOWN, IND.—The Mid-States Utilities Company, recently formed to take over the Georgetown (Ind.) Electric Light & Power Company, Leavenworth (Ind.)

Electric Light Company and other utilities in this section, contemplates the construction of transmission lines, and a number of substations will also be installed in the different localities.

MADISON, IND.—The Madison Light & Power Company has applied to the Commissioners of Jefferson County for authority to erect transmission lines over streets and highways in the town of Deputy, Jefferson County.

CHICAGO, ILL.—Bids will be received by the Clerk of the Sanitary District of Chicago, Room 700, 910 South Michigan Avenue, until Oct. 14 for construction of service building and fuel tanks for Division U of the Sanitary District. The work will consist of excavation, reinforced concrete work, miscellaneous metal work, electrical work, building and chimney superstructures, and furnishing and installing electrical and mechanical equipment. Harry E. Wallace is clerk.

NILES CITY, ILL.—The Sanitary District of Chicago, Room 700, 910 South Michigan Avenue, Chicago, plans to install electric power equipment in its proposed local service building, to cost about $800,000. H. P. Beiler, Chicago, is architect.

NORTH CHICAGO, ILL.—Extension of the ornamental lighting system along the Sheridan Road, from Tenth Street to Twenty-second Street, is under consideration.

APPLETON, WIS.—The installation of ornamental lamps on South Cherry Street from Memorial Bridge past the city limits to Foster Street, on West College Avenue, North State and other streets, is under consideration.

MANITOWOC, WIS. — The Wisconsin Public Service Corporation, Green Bay, is considering extensions to its transmission lines, including a line between Valders and Reedsville, a distance of 10 miles; from Francis Creek to Branch and from Sogg's Corners to Shoto.

WILMOT, WIS.—The electric plant and system of the Carey Electric Light & Power Company, which furnishes electric service in the towns of Wilmot, Slades Corners, Twin Lakes, Tombeau Lakes, Powers Lake and Lake Benedict, has been acquired by the Southern Wisconsin Electric Company, Lake Geneva. To improve the service in these communities, transmission lines will be erected to connect with the system of the Southern Wisconsin company, and the distribution systems in Powers Lake and Twin Lakes will be changed to three phase.

HERON LAKE, MINN.—The installation of an ornamental lighting system on Main Street, and also new street lamps on several other streets, is under consideration by the Village Council.

MINNEAPOLIS, MINN. — The Chicago, Milwaukee & St. Paul Railway Company plans to install new electric equipment in its local car shops, to cost about $36,000.

MINNEAPOLIS, MINN.—Receivers for the Chicago, Milwaukee & St. Paul Railroad Company, 80 East Jackson Boulevard, Chicago, have received permission from the Federal Court, to make improvements in the systems, to cost about $350,000, including electric equipment for transmission and shop service.

MOORHEAD, MINN.—The City Council is considering the installation of additional street lamps in various sections of the city.

JOPLIN, MO. — The Empire District Power & Light Company will soon ask bids for the construction of an office and operating building at Fifth and Joplin Streets, to cost about $180,000. Smith & VanPelt, Frisco Building, are architects.

MEXICO, MO.—The A. P. Green Fire Brick Company plans to install electric power equipment in its proposed plant addition, to cost about $200,000, for which bids will soon be asked.

SPRINGFIELD, MO.—Steps have been taken by the Commercial Club to secure the installation of an ornamental lighting system on Commercial Street.

MOBRIDGE, S. D.—Bids will be received by R. C. Riddell, city auditor, until Oct. 4 for a motor and pump with a capacity of 500 gallons per minute, against a head of 104 feet.

CREIGHTON, NEB.—Authority has been granted the Tri-State Utilities Company, Minneapolis, Minn., to erect a 22,000-volt transmission line from Creighton to New Brunswick to connect its power stations in this part of the state.

GORDON, NEB.—The municipal electric plant has been purchased by the Nebraska Electric Power Company, Lexington, which plans to erect a transmission line to connect the plant with the stations at Rushville and Hay Springs.

EUREKA, KAN. — The Eureka Glass Company contemplates the installation of electric power equipment in a proposed addition to cost about $200,000.

Southern States

LEXINGTON, N. C.—The City Commissioners are considering issuing $300,000 in bonds of which the proceeds of $40,000 would be used for extensions to the street-lighting system.

LEXINGTON, S. C.—The Lexington Water Power Company is considering plans for a new power plant, to cost about $75,000.

ATLANTA, GA.—The City Council is considering extending the ornamental lighting system on Whitehall Street, from Madison Avenue to the Central Railway of Georgia.

CORDELE, GA.—The Commissioners of Crisp County contemplate submitting the proposal to issue $1,250,000 in bonds for the construction of a hydro-electric plant on the Flint River to the voters at the November election.

CORDELE, GA.—Surveys are being made by the South Georgia Power Company, Albany, for the erection of a transmission line from Cordele and Unadilla via Vienna. The company has recently taken a lease on the power plants and distribution systems in Unadilla and Vienna and plans to furnish power in those cities from the power station in Cordele.

THOMASVILLE, GA.—Plans for the proposed manufacturing plant to be built by the Russell Furniture Manufacturing Company, to cost about $75,000, include a power plant.

WAYCROSS, GA.—Plans are under way by the Ware County Light & Power Company to extend its transmission line from Screven to Jesup to supply electricity in the latter place. The company plans to install street lamps in Patterson soon.

LAKE WORTH, FLA.—The City Council is considering calling a bond election to vote on the proposal to issue $600,000 in bonds for municipal improvements, including fire-alarm system, extensions to the municipal light and water systems, etc.

MONTICELLO, FLA.—The City Council has granted a franchise to J. E. Whiteworth, Perry, to construct and operate an electric light plant in connection with an ice and cold storage plant. The franchise also provides for the installation of an ornamental lighting system on highway No. 1, and highway No. 11 in the town.

PALMETTO, FLA.—Bonds to the amount of $30,000 have been voted for the construction of a power plant to furnish electricity for the ornamental lighting system.

PLANT CITY, FLA.—The electric substation of the Coronet Phosphate Company at Hopewell mines was recently destroyed by fire, causing a loss of about $25,000.

CHATTANOOGA, TENN.—Plans are being considered by the Commissioner of Hamilton County and property owners for the installation of an ornamental lighting system along the scenic route from Lookout Mountain to Signal Mountain, to cost about $25,000. N. Cummings, Chattanooga, is county judge.

MOUNT PLEASANT, TENN. — The Ruhm Chemical & Process Company plans to install electric power equipment, in connection with the proposed rebuilding of its plant, recently damaged by fire with loss of about $130,000.

CARROLLTON, ALA. — The Alabama Power Company, Birmingham, which has acquired the local electric plant, is planning to erect a transmission line for local service.

COLLINSVILLE, ALA.—The Fort Wayne (Ala.) Utilities Company, which has acquired the local plant, is planning extensions and improvements in the local electric system, including transmission line construction.

GULFPORT, MISS.—The installation of an ornamental lighting system on the Gulfport beach roads and on Twenty-fifth Avenue is under consideration.

STARKVILLE, MISS. — Improvements are contemplated to the local system of the Mississippi River Power & Light Company, Jackson, including the installation of new equipment and rebuilding the electric distribution system.

ATHENS, LA.—The local electric light plant was recently destroyed by fire.

JENNINGS, LA.—The Louisiana Electric Company, Lake Charles, plans to erect a transmission line from Elton, a distance of about 20 miles, to furnish electric service here.

OKLAHOMA CITY, OKLA.—The Oklahoma Gas & Electric Company is considering the installation of an underground conduit system to replace a number of overhead lines.

PONCA CITY, OKLA.—The City council is considering an issue of $160,000 in bonds to provide funds for extensions to the municipal electric plant, to include the installation of a 1,500-hp. Diesel engine and generator.

WEWOKA, OKLA.—The City Commissioners have called an election to vote on the proposal to issue $10,000 in bonds for the installation of an ornamental lighting system.

AMARILLO, TEX.—The Southwestern Telephone Company, Dallas, is planning to install an automatic telephone system, together with an exchange building in Amarillo, to cost about $2,000,000.

McALLEN, TEX.—The construction of a local substation is under consideration by the Valley Ice & Electric Company, San Benito. The company also contemplates building an ice plant of 75 tons capacity, to cost about $200,000.

PANHANDLE, TEX. — The initial installation in the power plant of the Panhandle Power & Light Company will have a generating capacity of 10,000 kw. instead of 5,000 kw. as reported in the issue of Sept. 18. All material and equipment for the complete plant have been purchased.

Pacific and Mountain States

SEATTLE, WASH.—Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until Oct. 5 for one telephone switchboard for the Puget Sound Navy Yard (Schedule 5981).

SEATTLE, WASH.—Plans have been accepted by the Board of Public Works for a dam to be built at Diablo Canyon in connection with the proposed second unit of the Skagit River hydro-electric project, and also for a railroad, 4¼ miles long, from George Creek to Diablo Canyon to cost about $3,400,000. Bids will be received for construction of the railroad by the Board of Public Works until Oct. 8. The work will include construction of railroad, 4¼ miles long, 1,500 ft. of incline railroad, diamond drilling for dam site, rip rapping dam, etc. Following the completion of this work a power plant will be built at Diablo Canyon to develop 75,000 hp. The equipment will include two 37,000 hp. turbines, transformers, switching equipment, etc., to cost about $2,689,500. The cost of the entire project is estimated at $6,989,500. F. R. Nicholas is special engineer for the Skagit project. J. D. Ross is superintendent of the Municipal Electric Light Department.

SHELTON, WASH.—The City Council has adopted a new street-lighting plan providing for the installation of ninety-four lamp standards. The West Coast Power Company, Gasco Building, Portland, supplies the lighting service here.

BERKELEY, CAL.—The City Council is considering the installation of an ornamental lighting system on Shattuck Avenue between University Avenue and Bancroft Way, to cost about $30,000 and on University Avenue between Oxford Street and San Pablo Avenue, to cost about $87,000.

LONG BEACH, CAL.—Plans have been filed by the Home Ice Company for a proposed cold storage and refrigerating plant, to cost about $150,000.

LOS ANGELES, CAL.—Bids will be received by the Board of County Supervisors, Court House, until Oct. 11, for the installation of an ornamental lighting system in Hollydale.

LOS ANGELES, CAL.—The Comanche Mining & Reduction Company, Los Angeles, has applied for permission to build a hydro-electric plant, using water from Montgomery and Marble Creeks, Mono County, for service at its mining properties. The cost is estimated at $275,000.

SAN DIEGO, CAL.—The City Council is considering the installation of ornamental lamps on Garnet Street, between Cass Street and the Ocean Boulevard and on Newport Avenue, using concrete standards.

SAN FRANCISCO, CAL.—Bids will be received by the Bureau of Supplies and

Accounts, Navy Department, Washington, D. C., until Oct. 5, for storage battery panel for the Mare Island Navy Yard (Schedule 6025).

SAN FRANCISCO, CAL.—The Pacific Gas & Electric Company has applied for permission to appropriate water from Deer Creek, a tributary of the Mokelumne River, Alpine County, for a hydro-electric power project, to develop about 14,000 hp. The cost with transmission system is estimated at $600,000.

SAN FRANCISCO, CAL.—The Pacific Gas & Electric Company has been granted permission by the State Department of Public Works, to use water from the north fork of the Yuba River in Yuba County, for a proposed hydro-electric power development, to cost about $200,000, with transmission lines.

SAN JOSE, CAL.—Plans are being prepared by the Pacific Gas & Electric Company, San Francisco, for the construction of a substation at Fox and Santa Teresa Streets, to cost about $400,000.

SANTA BARBARA, CAL.—The City Council plans to install ornamental lamps on Chapala Street, between Montecito and Anapamu Streets, using cast iron standards.

STORRIE, CAL.—Application has been made by Daniel McFarland, Storrie, and associates for permission to construct a hydro-electric plant on the Merced River, in Mariposa County, with an initial capacity of 13,750 hp. The cost $400,000, including transmission system, is estimated at $400,000.

OGDEN, UTAH.—Plans are under consideration to replace the arc lamps at street intersections with incandescent lamps of 200 cp. Under the new system 200-cp. incandescent lamps will be installed in the center of each block.

CHEYENE, WYO.—The City Council has adopted a resolution creating a new lighting district on Lincoln Highway and East Seventeenth Street, calling for the installation of sixty-two new lamp standards. The cost of the standards will be $9,542.

Canada

FERNIE, B. C.—Plans are being considered by the East Kootenay Power & Light Company to erect a steam-driven power lant at Crow's Nest Lake.

POINT GREY, B. C.—Bids are being received by the city of Point of Gret for the installation of a street-lighting system, 70,000 lineal feet (underground ssytem) in various streets, to cost about $86,000. J. W. Southin, 5,851 West Boulevard, Vancouver, is engineer.

WINNIPEG, MAN.—The City Council is considering the installation of ornamental lamps on Campbell Street, from Academy Road to Wellington Crescent, to cost $2,000, and on Montrose Street, from Academy Road to Kingsway, to cost $2,500.

SAULT STE. MARIE, ONT.—Work has started by the Spanish River Pulp & Paper Mills, Ltd., on extensions to its plant, including the installation of two steam turbine generators, rebuilding boiler house, installation of two lines of electric grinders, construction of new fresh water intake, etc. The cost of the entire project is estimated at $700,000.

BEAUHARNOIS, QUE.—The Beauharnois Electric Company, Ltd., has applied to the Public Service Commission for authority to erect transmission lines in the municipalities of St. Louis de Gonzague, Beauharnois and Howick.

COATICOOK, QUE.—Application has been made by the town officials to the provincial government for authority to construct a dam and hydro-electric plant on the Coaticook River in Coaticook.

METABECHOUAN, QUE.—Plans are under consideration by the Lake St. John Light & Power Company for further development work on the Metabechouan River in Metabechouan.

RAWDON, QUE.—The Quebec Southern Power Company, 180 St. James Street, Montreal, which has acquired further water power sites on the Cuareau River, plans to build a new local power plant to develop about 8,000 hp. The initial unit will have a generating capacity of 2,800 hp.

MONTREAL, QUE.—The City Council has appropriated $160,000 for the new street-lighting system.

WINDSOR MILLS, QUE.—The Canada Paper Company, Ltd., plans to install electric power equipment in a proposed addition, to cost about $165,000.

Electrical Patents

Announced by U. S. Patent Office

(Issued Sept. 7, 1926)

1,599,065. COOLING OF ELECTRIC MACHINES; R. Rudenberg, Berlin-Charlottenburg, Germany. App. filed Aug. 23, 1921. Extreme output is provided for by a supplementary or extraneous ventilation added to the ordinary normal ventilation.

1,599,121. PRODUCTION OF DEPOLARIZING AGENT FOR VOLTAIC BATTERY; T. A. Edison, West Orange, N. J. App. filed Jan. 5, 1921.

1,599,124. ELECTRIC CURRENT CORD HOLDER; G. Fisler, Cleveland, Ohio. App. filed Jan. 30, 1925. For appliances as irons.

1,599,161. CORE FOR INDUCTION FURNACES; C. A. Brayton, Jr., Cleveland, Ohio. App. filed Sept. 24, 1920. A fusible core that can be suspended within molds, such as are utilized in the construction of induction furnaces of the closed channel type.

1,599,232. REVERSING SWITCH; H. V. Haight, Sherbrooke, Quebec, Canada. App. filed June 26, 1925. Switches adapted to be manipulated by pneumatically actuated mechanism. An object of the invention is to direct exhaust pressure fluid from the switch operating mechanism against the switch terminals for extinguishing an electric arc formed as the circuit is broken.

1,599,241. ELECTRIC INCANDESCENT LAMP; G. Mery, Vienna, Austria. App. filed June 3, 1926. Having a tungsten filament which serves as the glower and is in the shape of a fine spiral with closely disposed windings.

1,599,259. ELECTRODE HOLDER; A. R. Welch, Easton, Pa. App. filed May 2, 1925. For use in electric welding.

1,599,268. METER; D. J. Angus, Indianapolis, Ind. App. filed May 29, 1924. Inking mechanism for graphic meters.

1,599,284. ANODE HOLDER; C. H. Proctor, Arlington, N. J. App. filed March 11, 1926. A holder for soluble anodes whereby a means is provided for maintaining a substantially constant anode surface.

1,599,304. TRANSFORMER; G. H. Tuttle, Warren, Ohio. App. filed Sept. 8, 1924. Tap-changing switch, especially adapted for use in connection with transformers. A tap-changing switch mechanism that will be operable from the exterior of the casing in which the mechanism is arranged in which the switch contacts are of improved construction that will positively clamp the switch blade or connector without depending upon the inherent flexibility of the metal of which the contacts are made and having an improved form of switch contact that will have a relatively large area of contact with the switch blade or connector and in which the connector is provided with an actuating rod that extends to the exterior of the casing and carries a handle having a swivel connection therewith so that it will not be possible to damage the switch mechanism by turning or twisting the handle. Also having an improved system of connections between the switch contacts and the taps, which extend to the transformer windings, that will permit a greater number of taps than has been possible with switch mechanisms heretofore used.

1,599,350. ELECTRICAL ADVERTISING MACHINE; C. G. Roesch, New York, N. Y. App. filed Nov. 7, 1924. A structure including a sign board which supports a plurality of electric light bulbs arranged in normally open circuits, and adapted to be illuminated in different combinations, for the purpose of forming any letter, word or combinations of letters on the board for advertising purposes.

(Issued Sept. 14, 1926)

1,599,415. ROTOR FOR ELECTRIC MOTORS; J. T. Janette, Chicago, Ill. App. filed Dec. 11, 1922. Means for securing the laminations of a rotor to the shaft and to provide for the simultaneous spiral mounting of the laminations.

1,599,483. ION CONCENTRATION CELL; H. C. Parker, Philadelphia, Pa. App. filed May 22, 1925. Cells utilizable in the production of electromotive forces representative of the concentration of a selected ion, as of hydrogen, hydroxyl, etc., in a solution or electrolyte; relates to the means or structure for effecting or providing one of the electrodes of such a cell, such as a constant half cell.

1,599,523. COMMUTATOR CONTROL OF BOOSTER ROTARY CONVERTERS; F. T. Hague, Pittsburgh, Pa. App. filed March 10, 1923. A method of and means for properly reversing the auxiliary commutating field upon the occurrence of inverted converter operation, using a double-acting torque motor which is capable of moving a reversing rheostat in either direction from its neutral position. Means for controlling an auxiliary shunt commutating winding on a rotary converter in accordance with the setting of the field rheostat of a booster associated therewith, and, at the same time, correcting the exciting current of the auxiliary commutating winding in accordance with the direction and magnitude of the load current of the converter.

1,599,544. ELECTRIC STEAM GENERATOR; J. H. Reed, Detroit, Mich. App. filed Oct. 7, 1924. Embodying a plurality of interconnected water tubes having a common steam reservoir. Means for housing and supporting electric heating elements within the water tubes.

1,599,546. REGULATOR SYSTEM; J. H. Ashbaugh, Wilkinsburg, Pa. App. filed Oct. 4, 1924. Means for providing overvoltage protection in case of sticking or freezing of the relay contact members.

1,599,556. ELECTRIC COOKING DEVICE; F. J. Cook, Cleveland, Ohio. App. filed April 10, 1925. A machine wherein food moves continuously through it and is cooked during such movement.

1,599,558. INSULATING BLOCK; F. Diehl, Elizabeth, N. J. App. filed March 5, 1921. For anchoring the portable cord in a sewing machine.

1,599,560. ELECTRIC TOASTER; K. Ehrgott, Forest Hills, Borough, Pa. App. filed March 13, 1924. A multiple-slice toaster having a relatively simple tiltable means for removing the toasted slices of bread.

1,599,562. ELECTRICAL MEASURING INSTRUMENT; R. D. Evans, Pittsburgh, Pa. App. filed Dec. 17, 1921. For measuring the true value of volt-amperes consumed in a given circuit, irrespective of the power-factor conditions.

1,599,570. TRANSFORMER; S. M. Lucas, Pittsburgh, Pa. App. filed Aug. 12, 1922. Which will deliver a substantially constant voltage to the secondary circuit under wide variations in the voltage applied to the primary. A transformer comprising a magnetizable core having a part of reduced cross-sectional area, a secondary winding on said reduced part of the core and a primary winding on another part of the core, a magnetic leakage member shunting the reduced part of said core, and an auxiliary winding on said leakage member; and an electro-responsive device connected with said secondary winding and said auxiliary winding in such manner that the voltages supplied to the device by the windings are in opposition; the parts being so adjusted that as the voltage applied to said primary winding rises above the normal value the voltage applied to said electro-responsive device remains substantially constant.

1,599,574. BLAST FURNACE BELL HOIST; P. McShane, Pittsburgh, Pa., and F. E. Lewis, East Pittsburgh, Pa. App. filed Oct. 4, 1924. Means for controlling the mechanism for charging blast furnaces.

1,599,575. ELECTRICAL MEASURING SYSTEM; P. MacGahan, Pittsburgh, Pa. App. filed Sept. 27, 1922. A method of basing the tariff for electrical power consumption that compensates for low power factor in multiphase alternating-current circuits. A method that shall compensate or penalize for unbalanced loads in a multiphase circuit.

1,599,580. INSULATOR; F. H. Miller, Wilkinsburg, Pa. App. filed Jan. 8, 1921. Of the pin type. Having an insulating shell or cover member substantially of bowl shape that conforms to the dielectric field and surrounds the insulator in spaced relation.

1,599,585. ELECTRICAL MEASURING INSTRUMENT; R. T. Pierce, East Pittsburgh, Pa. App. filed Aug. 9, 1924. A frequency meter of the dynamometer type that shall be exceptionally sensitive to changes of frequency or power factor.

1,599,605. TERMINAL FOR ELECTRICAL MEASURING INSTRUMENTS; W. H. Wood, Manchester, England. App. filed June 25, 1920. Using an insulating bushing secured with an inclosing cap of metal.

Business Facts for Electrical Men

Selected Statistics Presented Graphically for the Use of All Interested in Analyzing the Trend of the Electrical Business

More Electric Service, and Cheaper

IT IS well known that of all the important items which enter into the cost of living, the price of electricity alone has been decreasing, while everything else is more expensive than it was in 1913. The Bureau of Labor Statistics of the United States Department of Labor has just published data carrying definite information on this subject down to June of the present year.

From a summary of the figures for 32 cities, here presented in the form of a chart, it appears that the weighted average of all commodities under this rubric is about 75 per cent above the 1913 price, and has remained at that level with rather small fluctuations since 1921. The greatest rise occurred in house-furnishing goods, which are still more than twice as expensive as they were in the year of reference, although they have receded materially from the maximum. Food-stuffs, on the other hand, show the smallest net increase, being less than 60 per cent above the level of December, 1913.

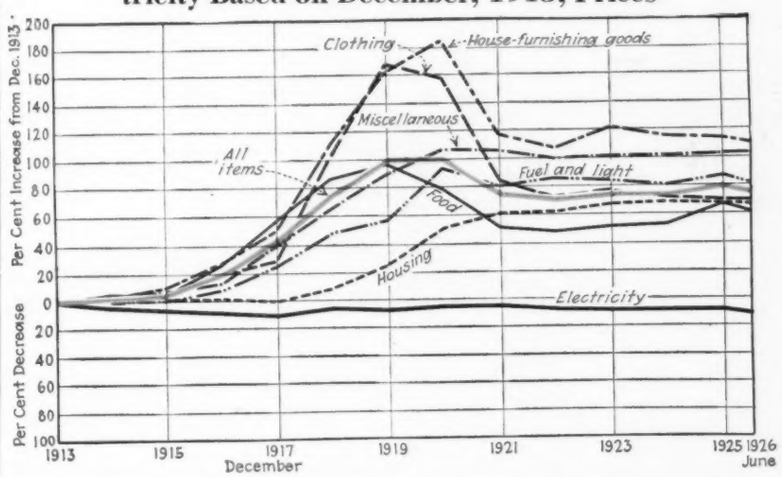
A different type of movement appears in the case of housing; the change here has been more gradual; instead of mounting sharply to a peak and then decreasing there has been an almost uninterrupted rise, but in the long run the result has been about the same, an increase of 65.4 per cent. Unlike food and clothing, houses are not consumed in the use, nor are they in any great degree abandoned or destroyed in response to the dictates of changing tastes or customs; what does happen, though, is that they are refurnished, redecorated and perhaps remodeled; the curves bear evidence of the effect on prices. The other figures for June are: Clothing, 68.2 per cent; fuel and light, 80.7; house-furnishing goods, 110.4; miscellaneous, 103.3 per cent. The combined cost for all items exceeds the cost in December, 1913, by 74.8 per cent.

In marked contrast, the cost of electricity has not only failed to participate in the upward movement but has notably decreased. Even during the period of highest prices it remained below the 1913 figure, and for the past five years the trend has been steadily downward. By last June the total drop amounted to 11.1 per cent. This takes no account of the increased efficiency of utilization, which has been very marked in the period under review, especially as regards lighting.

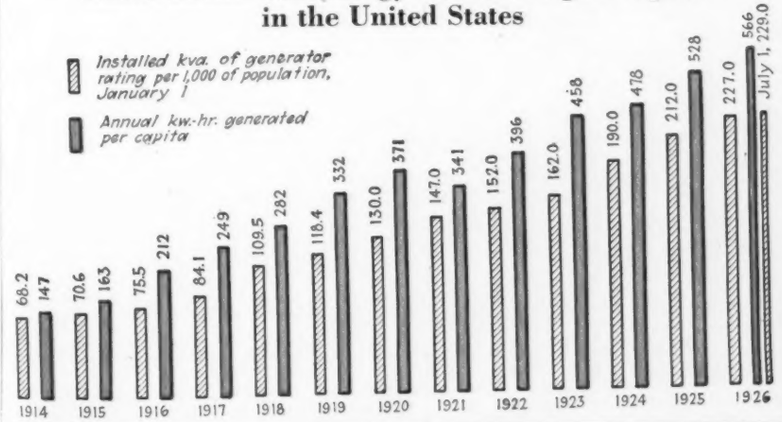
Thus the latest item to enter into the physical process of living, in the modern highly organized community, is the only one showing a decrease in cost. It is worth noting, also, that this item alone does not represent a material substance, but energy. In part it is a new and more convenient way of getting light and heat; to an increasing extent, however, it provides a means for supplanting human effort. More than the production of any other common commodity, the generation of electrical energy is a purely mechanical process; the industry has been able to a remarkable degree to avail itself of technical advances in plant design, of economies in operation, and of effective organization, all tending to lower the cost of production. The effect has been a cheapening of the price and a rapid increase in consumption, domestic as well as industrial.

The rate of increase in amount of energy generated by central stations, per capita, is evident from the other chart, which shows also the corresponding growth in generating equipment. The former has practically doubled since the beginning of 1914; the latest estimate is 566 kilowatt-hours per year. The installations have necessarily expanded in nearly the same ratio, and now stand at 0.23 kva. per capita.

Increase in Cost of Living and Decrease in Cost of Electricity Based on December, 1913, Prices



Growth of Central Electric Light and Power Station Installations and Energy Generated per Capita in the United States



Most of the data for statistics in the ELECTRICAL WORLD are gathered by it from original sources. Privilege is freely given to readers of the ELECTRICAL WORLD to quote for use these statistics for any legitimate purpose. While there is no requirement that the source of data be given, yet it would help the ELECTRICAL WOLRD in obtaining and compiling further basic information if those who make use of these statistics would give credit to the ELECTRICAL WORLD.

High August Operations in the Middle Atlantic States

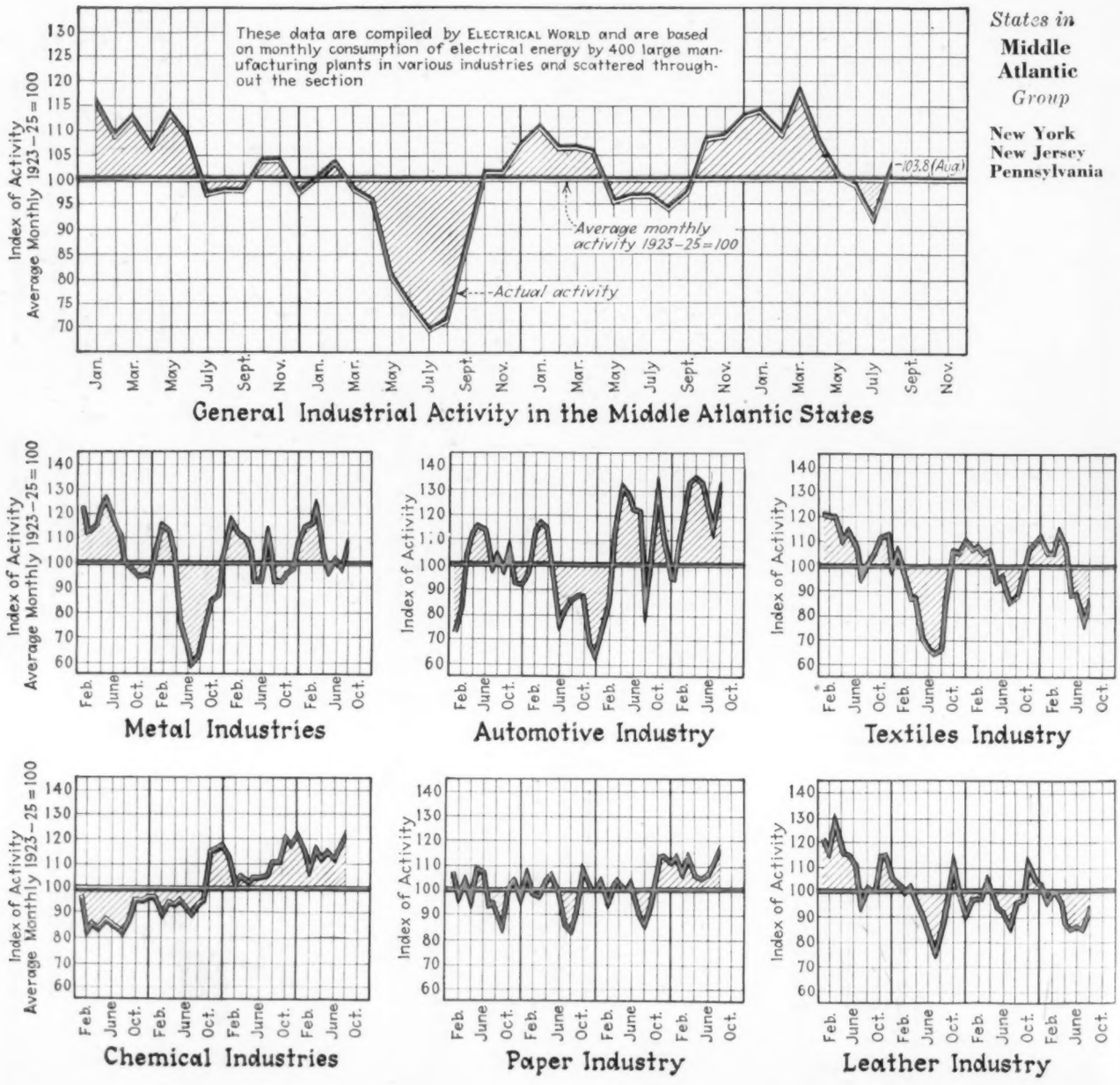
ACTIVITY in the manufacturing plants of the Middle Atlantic States during August was materially above that reported for July and also materially above that of last year. All of the six leading manufacturing industries of the section—chemicals, metals, leather, paper, textiles, and automotive—reported August activity above that of July. August manufacturing activity was 10.6 per cent over that reported for August of last year and 3.8 per cent above the average monthly activity for the past three years. Such is the picture of industrial operations painted by the ELECTRICAL WORLD based upon the monthly consumption of electrical energy of about 400 large manufacturing plants scattered throughout the section.

The returns received by the ELECTRICAL WORLD indicate that August general industrial activity in the Middle Atlantic States was 3.8 per cent above the average monthly activity for the past three years, this figure being unadjusted for seasonal variation, but weighted in accordance with the various industries. The prosperous condition of industry in the Middle Atlantic States today is even more clearly indicated when the fact is included that in August of last year general industry in the Middle Atlantic States was operating at 6.2 per cent below the average monthly.

The metal industries, which include rolling mills and iron and steel mills, as well as the ferrous and non-ferrous fabricating branches of the industry, were operating during August at 11.4 per cent above the July operations and 17.4 per cent over August of last year. The textile industry of this section reported August operations 15.2 per cent over those of July, this increased activity being largely seasonal in character. These plants were operating at practically the same capacity as during August of last year. The automobile plants continued to report a high rate of activity, August activities being about 19.5 per cent over those of July.

"Electrical World" Barometer of Industrial Activity in the Middle Atlantic States

(Data Unadjusted for Seasonal Variation)


These data are compiled by ELECTRICAL WORLD and are based on monthly consumption of electrical energy by 400 large manufacturing plants in various industries and scattered throughout the section
States in Middle Atlantic Group
New York
New Jersey
Pennsylvania
Index of Activity
Average Monthly 1923–25 = 100
103.8 (Aug.)
Average monthly activity 1923–25 = 100
Actual activity
General Industrial Activity in the Middle Atlantic States
Metal Industries
Automotive Industry
Textiles Industry
Chemical Industries
Paper Industry
Leather Industry